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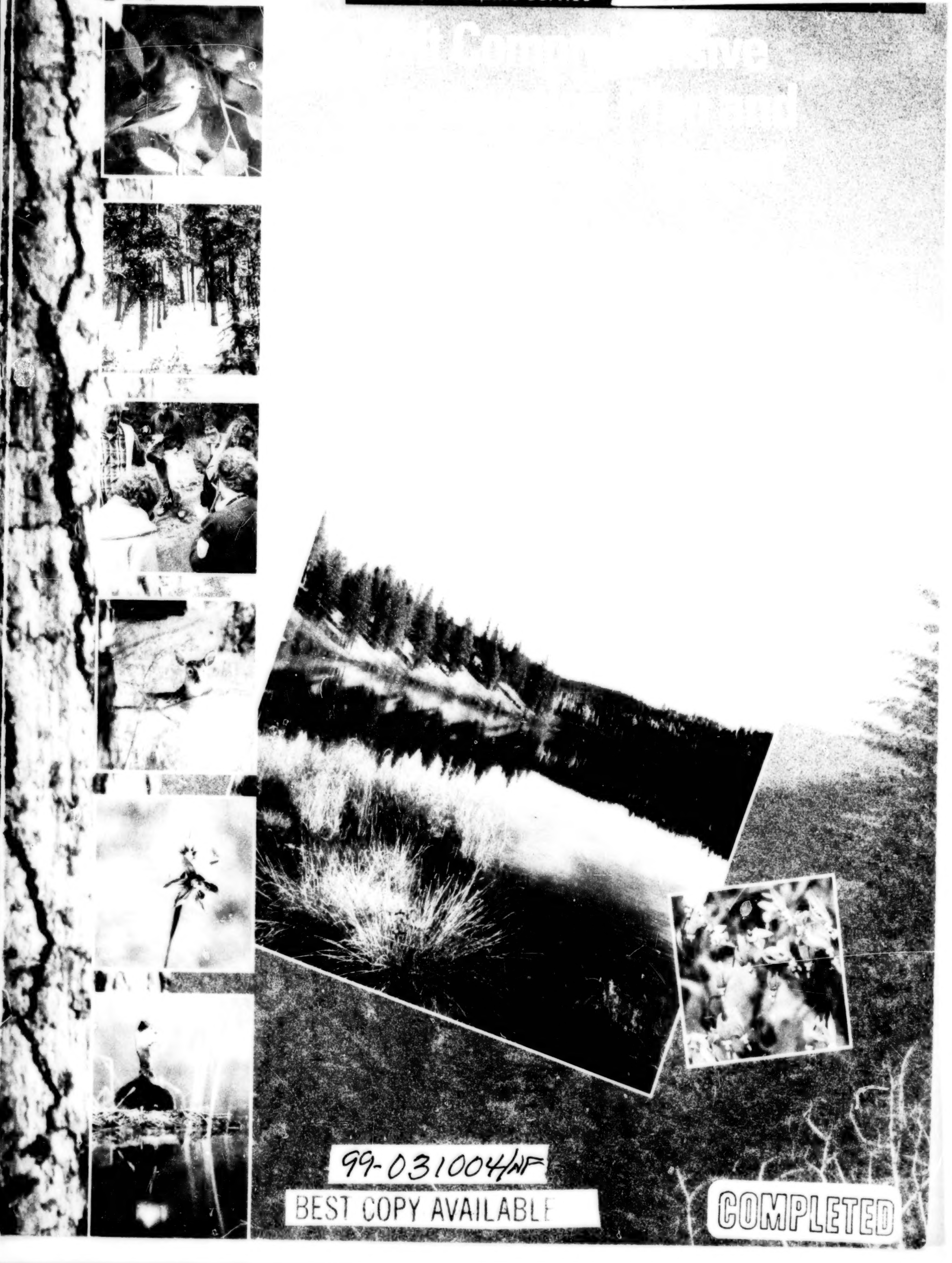

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DRAFT

COMPREHENSIVE CONSERVATION PLAN

AND

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

LITTLE PEND OREILLE NATIONAL WILDLIFE REFUGE

May 1999

Prepared by
U.S. Fish and Wildlife Service
Region 1

Pacific Northwest Planning Team
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Sherwood, OR 97140

Little Pend Oreille National Wildlife Refuge
1310 Bear Creek Road
Colville, WA 99114

Implementation of this Comr[illegible] Conservation Plan and alternative management actions/programs has [illegible] consistent with requirements of the National Environmental Policy Act (42 U.S.C. [illegible]).

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Little Pend Oreille National Wildlife Refuge
Comprehensive Conservation Plan (Proposed)
Stevens and Pend Oreille Counties, Washington

Type of Action: Administrative

Lead Agency: USDI, Fish and Wildlife Service

Responsible Official: Anne Badgley, Regional Director

For Further Information: Lisa Langelier, Refuge Manager
Little Pend Oreille NWR
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Abstract: A preferred alternative and four other alternatives are described and compared for the 40,198 acre Little Pend Oreille National Wildlife Refuge. The *five* alternatives are:

Alternative A. This alternative is the no action alternative as required by the National Environmental Policy regulations. Selection of this alternative would mean that there would be no change from past management programs and emphasis.

Alternative B. This alternative places management emphasis on restoration of habitat components such as mature forests and riparian habitats that support declining and rare species of plants and animals. Existing uses and recreational activities will be continued but some may be modified.

Alternative C. This alternative places management emphasis on restoration of habitat. Only priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 (Refuge system Improvement Act) will be allowed.

Alternative D. This alternative places a stronger management emphasis on restoration of habitat than Alternative C does. Only priority wildlife-dependent uses identified in the Refuge System Improvement Act will be allowed.

Alternative E. This alternative is a combination of Alternatives B and C. It places management emphasis on restoration of habitat components along with a mix of existing uses and priority recreation activities. **Alternative E is the agency preferred alternative.**

Comment Responsibility: Reviewers should provide the Fish and Wildlife Service with their comments during the review period of this draft environmental impact statement. This will enable the Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewer's position and contentions. Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

All comments received from the public will be placed in the Service's record for this action. As part of the record, comments will be made available for inspection by the general public, and copies may also be provided to the public. For persons who do not wish to have their names and other identifying information made available, anonymous comments are accepted.

Comment Period: Comments on this draft environmental impact statement should be mailed to the Little Pend Oreille National Wildlife Refuge **by no later than JUNE 30, 1999.**

Readers' Guide

The U.S. Fish and Wildlife Service planning process for all national wildlife refuges involves generally three levels of planning: 1) the development of a broad Comprehensive Conservation Plan (CCP); 2) the formulation of detailed step-down management plans; and 3) annual work plans and site specific projects. Public involvement and National Environmental Policy Act (NEPA) compliance are continued at all appropriate levels in the process. This Draft Environmental Impact Statement provides NEPA compliance for planning documents from all three levels of planning including plans in the appendices. The three documents include:

Draft Comprehensive Conservation Plan (Comprised of Chapters 1 and 2, the selected alternative from Chapter 3, Appendix C, and Appendix F)

The CCP is a document that provides a conservation vision for a refuge. It describes the desired future condition of fish, wildlife, and plants, and their habitats. The CCP provides direction to refuge programs through long range management goals and objectives. It also determines appropriate and compatible uses including recreational, commercial and permitted uses. To ensure biological integrity and diversity of the refuge, a variety of management, protection, and monitoring strategies and projects are identified. Decisions are based on public involvement, legislation, agency mission and guidance, NEPA compliance and compatibility determinations. The final CCP document for the Little Pend Oreille Refuge will be separated from the EIS and will consist of Chapter 1 - Introduction, Chapter 2 - Affected Environment, the selected alternative from Chapter 3, Appendix C - Preferred Alternative, and Appendix F - Compatibility Determinations.

Draft Fire Management Plan (Appendix G)

Refuge step-down management plans are working documents that provide guidance for the major refuge programs. The Fire Management Plan was written at the same time as the CCP and is included in this package to support the CCP and provide an opportunity for public review and comment. Management plans identify specific actions, locations, and techniques that will be taken to fulfill the goals and objectives outlined in the CCP. A Refuge can have several step-down management plans ranging from a habitat management plan to a sign plan.

Draft Forest Management Pilot Projects (Appendix E)

Annual work plans and site specific projects identify specific tasks for specific locations. These are typically completed in the current year. Three site specific forest management projects are included in Appendix E for public review and comment. With public input, the plans for these projects will be finalized at the same time the CCP is finalized. It is anticipated that on-the-ground forest management actions could take place in the winter months following the finalization of the CCP/EIS process if all compliance requirements are met.

Facts About the Little Pend Oreille National Wildlife Refuge

Location: The Refuge is located in Northeastern Washington, southeast of Colville in Stevens County.

Purpose: Little Pend Oreille NWR was established in 1939 "... as a refuge and breeding ground for migratory birds and other wildlife..." (Executive Order 8014) and " ... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act).

Acreage: Currently there are 40,198 acres, which equals 86% of the acquisition goal. Refuge inholdings total 6,500 acres and consist mainly of industrial timberlands owned by Stimson Lumber and Boise Cascade. Total acreage within the approved boundary is 46,700 acres.

Habitat: Elevations range from 1,800' on the western boundary to 5,600' on the eastern boundary. The Refuge is bordered on its southern and eastern sides by National Forests (Colville and Kaniksu) with scattered industrial timberland, state lands, and privately-owned small farms, ranches, and subdivisions on the north and west.

Refuge mixed conifer habitats include lowland Ponderosa pine, mid-elevation forest dominated by Douglas-fir, western larch, and lodgepole pine, and upper elevation forests of true fir, spruce, hemlock, and western red cedar. The Little Pend Oreille River flows through the northern portion of the Refuge. Eastern and southern boundaries follow the river's watershed divide. Small streams and lakes, marshes, open meadows, and former farm fields create diverse habitats on this forested refuge.

Wildlife: There are diverse montane forest and riparian wildlife communities. One hundred and eighty-six bird species have been recorded. Bald eagles use the Little Pend Oreille River during winter months. State candidate or species of concern occurring on the Refuge include: golden eagle; northern goshawk; flammulated owl; white-headed, pileated, Lewis', and black-backed woodpeckers; Vaux swift, pygmy shrew; fisher; and Townsend's big-eared bat. Forest passerine (perching) birds are plentiful and include a mixture of eastern and western species. Cavity-dependent birds, such as woodpeckers, nuthatches, and chickadee are abundant.

Lakes and marshes provide spring stopover points for migratory waterfowl. The Refuge provides habitat for breeding populations of Canada goose, mallard, and cavity-nesters including wood duck, Barrow's and common goldeneye, and common and hooded merganser. Native fish include cutthroat trout, red-sided shiner, and sculpin. Rainbow, brook, and German brown trout, and tench have been introduced. White-tailed deer, mule deer, elk, moose, black bear, cougar, coyote, lynx, and bobcat are some of the large mammals living on the Refuge. The presence of fisher, marten, wolverine, and gray wolf is unknown. The potential exists to manage for large species or species which require large tracts of forest habitat.

History: In 1939, most Refuge lands were acquired through the Resettlement Administration which retired marginal farmland. Other lands were either purchased from willing sellers, or acquired through exchange with Washington Department of Natural Resources.

The Washington Department of Fish and Wildlife managed the Refuge through a cooperative agreement from 1965 to 1994. Department management objectives emphasized game species and wildlife-oriented recreation. Habitat management action included timber harvest, prescribed fire, livestock grazing, forage planting, and noxious weed control. The U.S. Fish and Wildlife Service resumed on-site management in 1994.

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Summary

PROPOSED ACTION

The proposed action is to develop a Comprehensive Conservation Plan for the Little Pend Oreille National Wildlife Refuge that best achieves the unit's purpose, vision and goals; contributes to the System mission; addresses the significant issues and relevant mandates, and is consistent with principles of sound fish and wildlife management.

PURPOSE AND NEED FOR ACTION

Little Pend Oreille National Wildlife Refuge, established in 1939, is one of more than 500 refuges in the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (Service). In 1997, the National Wildlife Refuge System Improvement Act (Refuge System Improvement Act) (Public Law 105-57) was passed. The Act requires each national wildlife refuge to have a Comprehensive Conservation Plan (CCP). This document for the Little Pend Oreille Refuge is a combination of a draft CCP and a draft Environmental Impact Statement (DEIS).

The purpose of this Comprehensive Conservation Plan is to develop a vision for the Refuge and provide management guidance for maintenance, restoration, and use of Refuge resources during the next 15 years. Specifically, the CCP will:

- set a long term vision for the Refuge;
- establish management goals, objectives and strategies;
- define compatible recreational uses of the Refuge;
- determine the future use of livestock grazing;
- determine future Air Force Survival School training use of the Refuge;
- outline habitat and public use projects that support the goals and objectives;
- identify public entry points into the Refuge;
- describe forest management prescriptions for three areas; and
- adopt a step-down fire management plan.

Overall, there is a need to bring the Refuge in line with the National Wildlife Refuge System mission, goals, objectives and policies. A Comprehensive Conservation Plan is needed to address significant problems that may adversely affect the populations and habitats of fish, wildlife and plants and the actions necessary to correct or mitigate such problems. Specifically, these problems at the Refuge include the need to: ensure the biological integrity, diversity and environmental health of Refuge forests; restore degraded stream habitats; evaluate, and manage visitor use; and resolve conflicts between the U.S. Air Force use of the Refuge and the Refuge's wildlife purpose. In addition, the Refuge System Improvement Act directs the Service to provide, to the extent practicable, opportunities for people to experience compatible wildlife-dependent recreation.

Other agencies involved in discussions related to this document include the U.S. Forest Service, National Park Service, U.S. Air Force, Natural Resource Conservation Service, Washington Department of Fish and Wildlife, and Washington Department of Natural Resources.

The Comprehensive Conservation Plan provides a framework for future Refuge management. The analysis associated with implementation of the Plan is addressed at the programmatic level. Projects are not analyzed in detail. For example, additional planning, with consideration of site-specific impacts, will be necessary before facilities are built. An exception to this is the detailed analysis of forest management prescriptions for Starvation Flats, Minnie Flats, and Biarly Flats (Appendix E).

The Refuge System Improvement Act states that wildlife conservation is the priority of National Wildlife Refuge System lands and that the biological integrity, diversity, and environmental health of refuge lands shall be maintained. Each refuge must be managed to fulfill the Refuge System mission and the specific purposes for which it was established. Additionally, the Act identifies six wildlife-dependent recreational uses. These are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. As priority public uses of the Refuge System, these uses will receive enhanced consideration over other uses in planning and management.

Lands within the national wildlife refuge system are different from other, multiple use public lands in that they are closed to all public uses unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.

Brief History and Purpose of the Refuge

Beginning in 1879, the Refuge was homesteaded, farmed, grazed by livestock, logged and later classified "submarginal" for homesteading, although much of the Refuge was unaffected.

Executive Order 8104 (May 2, 1939) established the Little Pend Oreille Wildlife Refuge "... *as a refuge and breeding ground for migratory birds and other wildlife* ...". Lands added later to the refuge were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C. 715d) "... *for use as an inviolate sanctuary, or for any other management purpose, for migratory birds* ..."

Refuge Vision Statement

Forest habitat management is vital to the future of wildlife conservation in northeastern Washington. As the only mixed-conifer montane forest in the National Wildlife Refuge System, Little Pend Oreille National Wildlife Refuge has a unique role to play in forest habitat management. Its forests, streams, and wetlands are used seasonally by bald eagles and numerous migratory birds for nesting, foraging and migration. It provides critical winter range for deer and habitat for several species of interest including the Canada lynx and flammulated owl.

The Service envisions using this Plan to build on native wildlife habitat diversity as a theme with emphasis on developing late successional forest and restoring riparian habitat - habitats that are increasingly rare in the region. In the next 15 years, Refuge staff will focus management efforts in over-stocked stands of dry forest using thinning and prescribed fire techniques that mimic natural ecological processes, such as wildfire. Degraded streams will be restored to enhance and maintain the natural diversity of the Refuge.

A healthy Refuge environment will provide opportunities for visitors to enjoy wildlife viewing, hunting, and fishing in a natural setting. Interpreting wildlife and the Refuge's unique heritage, as well as improving facilities will enhance the visitors' experience while protecting the cultural integrity of the area. To meet these challenges, the U.S. Fish and Wildlife Service will continue to seek partnerships with other agencies, interest groups, landowners, and local communities. These efforts will result in greater protection of wildlife and fish resources throughout northeastern Washington.

Refuge Goals

The following broad goals are proposed for the Little Pend Oreille NWR. They are consistent with Refuge purposes, Refuge System goals, the National Wildlife Refuge System Improvement Act of 1997, Service policy, and international treaties.

Goal 1: ***Conserve, enhance and restore native forest, riparian, in-stream, and wetland habitats representative of the native habitat diversity of northeastern Washington.***

Goal 2: ***Monitor, protect, and recover special status plants and animals and species of management interest.***

Goal 3: ***Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.***

ALTERNATIVES

Alternatives, developed to comply with the National Environmental Policy Act, provide ways to address and respond to major public issues, management concerns, and opportunities identified during the planning process.

A number of issues were identified during the public scoping process. Alternatives then were developed in response to identified issues. Habitat restoration is a common element in each action alternative. The alternatives are intended to provide a range of uses and access, and respond to the significant issues. Five alternatives are described and evaluated in the draft EIS:

- Alternative A: No Action-Status quo;
- Alternative B: Restoration of Wildlife Habitat with Management of Existing Uses;
- Alternative C: Restoration of Wildlife Habitat emphasizing Priority Uses;
- Alternative D: Ecological Reserve Strategy; and
- Alternative E: Combined Alternatives B and C.

The preferred alternative is the alternative that would best achieve the refuge purpose, vision and goals; contributes to the refuge system mission; addresses the significant issues; and is consistent with principles of sound fish and wildlife management. **The preferred alternative (Alternative E) with associated objectives, strategies, and projects represents the draft Comprehensive Conservation Plan for the Little Pend Oreille NWR.**

This section describes five alternatives:

ALTERNATIVE A: NO ACTION — STATUS QUO

This alternative assumes no change from past management programs and emphases. No changes would be made to current uses, which include Air Force survival training, livestock grazing, hunting, fishing, camping, snowmobiling, and horseback riding. In the past, management for game species was very important and the forest management policy required that all wildfires must be suppressed as quickly as possible.

ALTERNATIVE B: RESTORATION OF WILDLIFE HABITAT AND MANAGEMENT OF EXISTING USES

Alternative B places new management emphasis on the restoration of habitat such as mature dry forest ponderosa pine and riparian habitats that support declining and rare species of plants and animals. Under Alternative B, existing uses and recreation activities will be modified but continued. Recreation activities would include hunting, fishing, wildlife observation, camping, horseback riding, and snowmobiling. The annual livestock grazing program would be continued but would have limitations on numbers of animals, locations, and time of year. A major change would be to move grazing out of riparian zones and high-elevation areas. This would require building additional fences to control livestock use. The Air Force survival training program

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would be continued, however, training intensity would be reduced and helicopter use eliminated except in emergency situations.

ALTERNATIVE C: HABITAT RESTORATION EMPHASIZING PRIORITY REFUGE SYSTEM USES

This alternative would also place management emphasis on mature dry forest ponderosa pine and riparian habitats that support declining and rare species of plants and animals. Priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 would be the only activities allowed. These are hunting, fishing, wildlife observation and photography, and environmental education and interpretation activities. Hunting opportunities would be expanded and additional effort would be spent on environmental education activities and interpretation. Other existing recreational activities such as camping, horseback riding, and snowmobiling would be eliminated. No annual livestock grazing program would be included but some limited livestock grazing may occur, in order to meet specific wildlife and habitat objectives. The Air Force survival training program would be discontinued.

ALTERNATIVE D: THE "ECOLOGICAL RESERVE" ALTERNATIVE

The focus of Alternative D is to manage the refuge as an ecological reserve. To some, the theme may evoke ideas of "passive management" such as often occurs in wilderness areas. However, objectives encompassed in Alternative D are more complex than a sole strategy of passive management allows. The key components of the Alternative are to promote habitat restoration, especially in the dry forest zone, to restore aquatic conditions to natural states, and to effectively enlarge roadless areas in the eastern refuge by reducing human intrusions. The Alternative would support the priority uses established under the National Wildlife Refuge System Improvement Act of 1997. Hunting of forest predators such as bear, and cougar, would be eliminated, so as to diminish interference with the natural process of predation. Only no-trace camping would be allowed. Other uses such as horseback riding, livestock grazing, and the Air Force survival training would be eliminated from the refuge. Roads, except for four public access points to the refuge would be blocked or gated to create a large area within the eastern half of the refuge that would remain essentially free of human disturbances throughout the year. Inholders access would be managed through a cooperative gating system.

ALTERNATIVE E: COMBINED ALTERNATIVES B AND C-- (AGENCY PREFERRED)

As a combination of Alternatives B and C, Alternative E places management emphasis on restoration of habitat components such as mature dry forest ponderosa pine and riparian habitats that support declining and rare species of plants and animals. Under Alternative E, a mix of existing uses and priority recreation activities will be managed. A wide range of recreational activities would be supported including hunting, fishing, wildlife observation, camping, horseback riding, photography, and interpretation. Snowmobiling would be eliminated. The

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annual livestock grazing program would be discontinued, however some periodic grazing may occur to meet wildlife objectives. The Air Force survival training program would be phased out over 5 years. Other recreational uses, such as camping and horseback riding would continue, but would be restricted in some areas and during some seasons. Camping would be restricted in environmentally sensitive areas such as riparian zones.

Features Common to all Alternatives

All Alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual Alternative descriptions.

- *Refuge Boundary and In-holdings*

  The Refuge boundary remains the same across all Alternatives. There is continued interest by the Fish and Wildlife Service to consolidate management of lands within the existing Refuge boundary. This could be done through management, protection, exchange or acquisition of the approximately 6500 acres of in-holdings within the boundary. A significant portion of these in-holdings are industrial timber land including Boise Cascade (approximately 1600 acres) and Stimson Lumber Company (approximately 4500 acres).

- *Other Refuge-Managed Parcels*

  The Little Pend Oreille NWR currently manages two fee properties outside of the approved boundary of the Refuge: the Norris Tract (54.7 acres) near Springdale, Washington and the Cusick track (298 acres) north of Cusick, Washington; and four conservation easements ranging in size from 10 to 65 acres in Stevens County. All of these properties resulted from Farmer's Home Administration land disposal through loan defaults. Fee title lands are transferred to the Service for management while conservation easements transfer only the rights of easement management and serve to protect wetlands and converted wetlands through restrictions that are perpetual. These tracts will be managed consistently with the management alternative selected for the primary refuge. In addition, a step-down management plan will be prepared for each of these units. The Kalispel Tribe of Indians has expressed interest in cooperatively managing the Cusick unit which is located close to tribal lands. Partnerships will be considered for the cooperative management of outlying units.

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Summary of Alternatives Found in the Draft CCP/EIS

Program or Issue	Alt. A (Status quo)	Alt. B (Restoration of wildlife habitat and management of existing uses)	Alt. C (Restoration; emphasizing Refuge System Priority uses)	Alt. D (Reserve strategy, reduce human disturbances)	Alt. E (Combined B and C, Agency Preferred)
HABITAT RESTORATION PROGRAMS					
Forest management	Limited forest management. Some salvage activities and precommercial thinning. Limited prescribed fire and total fire suppression.	Restore natural forest structure and composition. Manage to increase amount of mature and old stands. Use thinning and selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition. Manage to increase amount of mature and old stands. Use thinning and selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition and role of fire, using thinning and prescribed fire. Avoid road building and harvest in unlogged stands. Suppress wildfires using low impact techniques.	Restore natural forest structure and composition. Manage to increase amount of mature and old stands. Use thinning and selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.
Riparian and stream management	No change: no plantings or restoration.	Repair/improve roads that impair fish health, plant and stabilize streambanks.	Repair/improve roads that impair fish health; plant and stabilize streambanks. Instream flows take priority over diversion flows.	Breach dams and diversions to restore natural waterflow. Repair or obliterate roads that impair fish health; stabilize streambanks.	Repair/improve roads that impair fish health, plant and stabilize streambanks. Instream flows take priority over diversion flows.
Noxious Weed Management	Use integrated pest management methods to treat 34 miles of road-side weeds plus 12 acres of non-forest habitats.	Use integrated pest management methods to annually treat 50 miles of road-side weeds plus 250 acres of non-forest habitats and 250 acres of forested habitat.	Use integrated pest management methods to annually treat 50 miles of road-side weeds plus 250 acres of non-forest habitats and 250 acres of forested habitat.	Use integrated pest management methods to annually treat 50 mi. of road-side weeds + 350 acres of non-forest habitats & 350 acres of forested habitat.	Use integrated pest management methods to annually treat 50 miles of road side weeds plus 250 acres of non-forest habitats and 250 acres of forested habitat.
OTHER PROGRAMS					
Livestock grazing	No change; up to 750 AUMs annually.	Modified grazing program outside riparian areas to benefit deer	Phase out annual program; use grazing only to achieve wildlife objectives.	Phase out annual program in five years.	Phase out annual program, use grazing only to achieve wildlife objectives
Air Force Survival School	No change. Use mostly in late summer w/ an avg of 90 personnel/day. Ground/helicopter use.	Only non-wildlife- disturbing activities. Helicopters only in emergencies.	Phase out over five years	Phase out over five years	Phase out over five years.

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Summary of Alternatives Found in the Draft CCP/EIS

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E Agency Preferred
PUBLIC ACCESS AND RECREATION					
Entrances and roads	No change (12 entrances, 201 miles of total roads, 91 miles of open roads). Close selected roads during spring breakup.	Eight entrances. Close or obliterate selected roads. Close all but the county-maintained roads and Olson Creek Rd. from Jan. 1 - Apr.15.	Eight entrances. Close or obliterate selected roads. Close all but the county-maintained roads and Olson Creek Rd., Jan. 1- Apr. 15	Four entrances. Protect roadless area by closing several roads including Blacktail Mtn. and Cedar Cr. Rds. Close all but the county maintained roads.	Eight entrances. Close or obliterate selected roads. Close all but the county and Olson Creek Rd., Jan. 1-Apr. 15.
Hunting	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs.	Allow deer, elk, gamebird, and waterfowl hunting. Eliminate predator hunting.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs
Wildlife Observation Interpretation Photography	Minimal programs as staff time allows	Minimal programs as staff time allows	Increase available viewing information and opportunities; offer new programs, and events	Minimal programs as staff time allows.	Increase available viewing information and opportunities, offer new programs, and events.
Fishing	Continue current April - October fishing opportunities.	Continue current April - October fishing season. Enhance natural spawning in lakes.	Continue current seasons, increase catch/release on LPO River. Enhance natural, lake spawning. Open lakes on July 1 to protect nesting birds.	No stocking. Breach stream diversions and dams to restore natural hydrology.	Continue current April - October fishing season and increase catch and release fishing in LPO River. Enhance natural spawning in lakes
Camping	Unregulated. Five designated campgrounds and many dispersed sites.	Allowed in designated campgrounds and dispersed sites only between Apr. 15 and Dec. 31. No dispersed riparian camping.	Eliminated	Primitive (no-trace) camping only. Close campgrounds & camps accessible by vehicle.	Allowed in designated campgrounds Apr. 15 - Dec. 31 and designated dispersed sites only Oct 1 to Dec 31 No dispersed riparian camping.
Horseback Riding	Unregulated	Develop plan addressing horse camping, trails, feed, and maintenance.	Eliminated	Eliminated	Develop plan addressing horse camping, trails, feed and maintenance.
Snowmobiling	Only allowed on Olson Cr. And Blacktail Mtn Roads.	Maintain snowpark but eliminate snowmobiling on Refuge	Remove snowpark and eliminate snowmobiling on Refuge	Remove snowpark and eliminate snowmobiling on Refuge	Remove snowpark and eliminate snowmobiling on Refuge

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- *Land Protection Strategy Outside Approved Boundary*

The Service has the ability to protect and acquire key wildlife habitats outside of the approved Refuge boundary. Additional NEPA analysis will be necessary to evaluate the environmental effects of protecting or acquiring lands before they can be added. Land protection methods may include cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants would be considered for any of these approaches. Priority for protection will be lands adjacent to the refuge particularly riparian, wetland, Ponderosa pine and high elevation forest (above 4,000 foot elevation) habitats. Medium priority for protection will be lands adjacent to other Service managed properties in Stevens and Pend Oreille Counties and seasonally flooded agricultural lands within the Colville River floodplain.

- *Protection of the Kaniksu Unit, A Separate but Related Action*

The Service is currently in the process of evaluating the potential acquisition of 720 acres being offered by one landowner northeast of Deer Lake, Washington. This property is referred to as the Kaniksu Unit. Approximately 550 acres of this property are under a perpetual wetland easement administered by the Natural Resource Conservation Service. A separate environmental assessment will be completed if the preliminary project proposal is approved by the Washington Office.

- *Protection of Existing Research Natural Areas (RNA)*

Two Research Natural Areas (RNA)s on the Refuge will be maintained and protected for their research values. In general "passive" or natural management will be practiced in the RNAs, including "hands-off" management of wildfire unless external lands appear threatened. Baird Basin RNA is a 160- acre tract in the North Fork of the Bear Creek watershed, representing three forest cover types under the Society of American Forester's classification system: Larch-Douglas Fir (SAF 212), Ponderosa pine-Larch-Douglas fir (SAF 214) and Lodgepole Pine (SAF 218). Varline Grove RNA is an 80-acre tract representing the Lodgepole Pine cover type (SAF 212).

- *Protection of Roadless Area*

A 5,520-acre roadless area exists in the southeast corner of the refuge that may have potential for wilderness designation. All of the alternatives considered in this draft CCP/EIS would be managed in such a manner that the primitive roadless character of this area and associated values are not impaired. The roadless area of the Refuge will be studied further in the step-down management planning process (Habitat and Public Use) to determine if it is suitable as a Wilderness Study Area.

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- *Tribal Coordination*

Common to all alternatives will be increased regular communication with American Indian Tribes who have an interest in the Refuge. The Kalispel Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Spokane Tribe of Indians are three local tribes the Refuge will work with regarding issues of shared interest.

- *Volunteer Opportunities and Partnerships*

Volunteer opportunities and partnerships occur in all alternatives. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans and projects.

- *Refuge Revenue Sharing Payment*

Annual payments to Stevens and Pend Oreille Counties will continue at similar historic rates under each alternative. Total payment made to Stevens County in 1997 was $231,804. If in-holding lands are acquired and added to the Refuge then the county payment will increase accordingly.

- *Salvage Harvest by Permit*

Salvage harvest is allowed on the Refuge with a special use permit only, when wind or other events add excessive, high-risk fuels. This use will continue under all alternatives, where opportunities arise and where salvage could be used to further other forest habitat management objectives.

- *Firewood Cutting by Permit*

The firewood cutting permit system remains the same under all alternatives. Current Refuge policy is to allow cutting between August 1 and November 1. Each permittee is allowed to cut up to two cords of downed wood within 200 feet of a designated road. The number of permits issued, cords allowed, and locations will vary from year to year based on conditions, demand, and need.

- *Maintenance and Updating of Existing Facilities*

Periodic maintenance and updating of Refuge administrative facilities will be necessary regardless of the alternative selected. Facilities include the Refuge headquarters complex, one government residence and two cabins. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs. Currently, the headquarters office is being expanded/remodeled to add office space. Funding has been acquired to upgrade the storage building. Funding needs have been identified to upgrade and enlarge the shop and to renovate the Winslow cabin to provide volunteer housing.

- *Protection and Management of Cultural Resources*

  The Service has legal responsibility to consider the effects its actions have on archeological and historic properties. Under all alternatives, the Service will manage cultural resources in accordance with public law and agency policy. To this end, small projects will require a "Request for Cultural Resource Compliance" form be completed in conformance with the Programmatic Agreement among the U.S. Fish and Wildlife Service Region 1, the Advisory Council on Historic Preservation, and the State of Washington Historic Preservation Officer. Additional consultation, surveys, and clearance will be required when large projects are sponsored by the Refuge or when activities will affect properties eligible for the National Register of Historic Places (more than 50 years old).

- *Management of Minor Recreational Uses*

  Certain recreational activities are occasionally pursued on the Refuge. Under all alternatives, any group activity involving more than 25 people will require a Special Use Permit. Dog sledding and search and rescue will also require Special Use Permits. Antler collecting, mushroom harvest and berry gathering are considered incompatible uses (see Appendix F) and will not be allowed. Other recreational activities not specifically addressed in this document (cross country skiing, snowshoeing) will be allowed to continue on Refuge lands unless they are found to conflict with wildlife or habitat objectives.

- *Wildlife Habitat*

  Important habitats for wildlife will be identified, protected, and enhanced including but not limited to suitable snags, downed wood, movement corridors, late successional forest communities, wetlands, and aspen groves.

AFFECTED ENVIRONMENT

Geographical and Ecological Setting

The Little Pend Oreille NWR is located in northeastern Washington, about 70 miles north of Spokane and ranges from about 1,800 to 5,600 feet above sea level.

Within the 1939 Executive Order boundaries of the Refuge are approximately 6500 acres of inholdings. Most of the inholding parcels are owned by Stimson Lumber Company, or Boise Cascade, both commercial timber companies.

On non-Fish and Wildlife Service managed land surrounding and within the Refuge boundary, there are increasing trends towards road development, forest fragmentation, loss of older aged-forest, recreational use, riparian habitat degradation, and rural residential development.

The Refuge is a mixture of diverse habitats including: riparian, aquatic, fields, and forests types that support stands of Douglas-fir, ponderosa pine, grand fir, cedar, hemlock, western larch, subalpine fir, and aspen. Riparian areas provide some of the Refuges' most species rich-habitats.

Landscape Perspective

Although forest cover types continue to be found over approximately the same total areas as in 1900, dramatic changes in forest structure have occurred over large areas of the Colville River watershed. Specifically, old single-strata forest is gone from the watershed completely and old multi-strata forest covers only about 10% of its former area in the watershed. And young forests, particularly the mid seral types of young multi-strata forest and understory reinitiation forest cover about 15-18 times their extent in 1900. These changes in forest structure on a sub-basin scale have significant repercussions for wildlife habitat, especially for those species with narrower habitat requirements. At the scale of the entire Interior Columbia Basin, at least eight terrestrial vertebrate species have experienced a loss of greater than 67% of the habitat available to them historically, while an additional 47 terrestrial species have experienced a loss of 33-67% of their historical habitat (Wisdom, et. al. 1998). These species include the white-headed woodpecker, the flammulated owl, Western bluebird, hoary bat, and many others.

There has been a clear shift in fire regimes throughout the Colville River watershed from frequent to infrequent fires. In general, fires regimes have also become more lethal. Specifically, non-lethal, frequent and very frequent fires and mixed, frequent fires have declined, with a corresponding dramatic rise in lethal and infrequent fires. The frequent, non-lethal fires of the past contributed to the maintenance of large trees and open understories typical of single strata ponderosa pine. The loss of frequent and non-lethal fires have led to ever-increasing fuel loads, crowded and over-stocked forest stands and a greater and greater risk of catastrophic (lethal) fire occurrence.

Fish and Wildlife and their Habitat

The Refuge supports a variety of wildlife and fish common to riparian, field, and forest habitats, including approximately 196 species of birds, 58 species of mammals, and 14 reptiles and amphibians. The Refuge also includes parts of all the major forest zones located in Northeast Washington, from the dry forest of ponderosa pine through the moist, mixed conifers, to the cold forest of Engelmann spruce and subalpine fir zone. Not only is the Refuge one of the largest refuges in the state, it is bordered by the Colville National Forest on two sides, essentially magnifying the Refuge's value for wide ranging species of wildlife.

The only federally listed threatened and or endangered species known to regularly occur on the Refuge is the bald eagle. Bald eagles are frequently seen along the Little Pend Oreille River, primarily in winter. Habitat also exists for the Canada lynx, a species recently proposed for listing by the U.S. Fish and Wildlife Service and recent sightings on the Refuge, through unconfirmed, are thought to be credible. Migratory birds are of particular interest due to being mentioned in the Executive Order establishing the Refuge. White-tailed deer are a species of local interest and have historically been a focus of management activities at the Refuge.

Many species of waterfowl have been observed on the refuge. Duck species include mallard, ruddy, redhead, common goldeneye, ringneck, and bufflehead. Wood ducks and green-wing, blue-wing and cinnamon teal are all commonly observed, along with common and hooded mergansers. Canada geese breed on several Refuge lakes and wetlands. Migratory and other birds of interest include the American redstart, northern goshawk, flammulated owl and ruffed grouse.

The Little Pend Oreille River (approximately 10 miles) and the main fork and North Fork of Bear Creek (approximately 15 miles) provide most of the in-stream fish habitat managed on the Refuge. The four trout species that are found are rainbow, cutthroat, brook, and brown trout. Native non-game species observed are redside shiner and shorthead sculpin. Amphibian species known or suspected to occur on the Refuge include tiger salamander, long-toed salamander, western toad, Pacific tree frog, and Columbia spotted frog.

While no Federally listed proposed, threatened or endangered plant species are known to inhabit the Refuge, one Washington State threatened species, adder's-tongue (Ophioglossum pusillum), was found. Most Refuge habitats harbor non-native plants. Some of these plants occur incidentally but others, having a tendency to invade and displace native plants, are considered noxious weeds. Weeds that occur on the Refuge include leafy spurge, plumeless thistle, and yellow hawkweed.

Approximately 200 miles of roads currently exist within the Little Pend Oreille National Wildlife Refuge administrative boundary. The majority of these roads are located on Refuge lands; others are situated within inholdings. Approximately half of these roads are infrequently used and would need clearing for vehicle access.

Refuge Recreation and Special Uses

The Refuge receives between 20,000 and 30,000 visitors each year. The two most popular recreational activities are fishing and hunting. Several species of big game, small game, predators, and migratory waterfowl are hunted on the Refuge. There is also a growing interest in wildlife viewing. With the exception of the early spring fishing season and the fall deer hunting season, most Refuge camping is not directly associated with other Refuge uses such as hunting, fishing, wildlife observation or photography. Horseback riding, including organized rides also occurs on the Refuge. Other recreational activities include snowmobiling, mountain biking, cross-country skiing, and dog sledding.

Two Research Natural Areas have been established within the Refuge. These areas protect natural features and preserve natural processes for scientific purposes; the guiding principle is to prevent unnatural encroachments and activities which directly or indirectly modify ecological processes. There is also a 5,520 acre block of unroaded and largely undisturbed forest in the southeastern corner of the Refuge.

For the past 33 years, the Air Force Survival School has used the Refuge and adjacent lands for survival and evasion training. The training occurs from January through September, with concentrated use in the late summer. The Refuge area has a history of being homesteaded, logged, and farmed. A livestock grazing program has been managed to some degree on the Refuge since its establishment. No prehistoric sites have been located within the Refuge.

ENVIRONMENTAL CONSEQUENCES

Effects to Forest Habitats

Coniferous Forests

Ponderosa pine and Douglas-fir (dry site) forest habitats would be actively managed under Alternatives B, C, D, and E using precommercial and commercial thinning, selective harvest, and prescribed fire. Approximately 1,000 acres per year would be treated, with an overall goal of treating approximately 15,000 acres over the 15-year span of this plan. The long term intent of the treatments under these alternatives is to restore the forest structure and composition to conditions more closely resembling the conditions present in the mid 1880s, just prior to settlement by American pioneers, homesteaders, and miners. Thinning and use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long term, thus lessening the likelihood of a "catastrophic" fire that could wipe out huge areas. Treatments in Alternatives B ,C, and E would begin the process of promoting forest stand development into mature and old stages. These habitats are increasingly scarce at a regional scale (especially the mature ponderosa pine stand types) and have important values to native wildlife.

Alternative D would adopt a slightly more conservative approach than Alternatives B, C, or F. Under Alternative D, forest areas that remain unroaded would not be commercially thinned or salvaged. Low impact techniques for fire suppression would be used across the Refuge as much as possible. Benefits to interior forest dwelling and disturbance sensitive wildlife would likely be higher, at least under the short term, than under Alternatives B, C, or F.

Alternative A takes a largely passive management approach, proposing a limited amount of activity, mainly salvage and limited thinning and burning. Wildfires would also be actively suppressed. Under this alternative tree density would remain high and species conversions to shade tolerant types would continue, augmenting problems associated with forest health. This would result in increased fuel loadings, such that over the long term, these conditions would probably make catastrophic wildfire inevitable, despite fire suppression efforts.

Riparian and Deciduous Forests

Alternatives B, C, D, and E each propose active measures to plant trees and shrubs in devegetated or degraded riparian areas. These alternatives also would eliminate livestock grazing completely (Alternative D) or in riparian areas (Alternative B), or use grazing only as an occasional vegetative management tool (Alternatives C and E). The elimination of annual livestock grazing from riparian areas can dramatically speed the vegetative recovery of bare and degraded sites. Other active measures to restore aspen pockets (both through use of fire and curtailing of grazing) would also occur under Alternatives B, C, and E. Alternatives B, C, D, and E would all reintroduce periodic fire into the landscape which may have positive benefits to aspen.

Some riparian areas on the Refuge are in poor condition due to recreational use. Alternative C, which eliminates all Refuge camping, would go the furthest to aid recovery of riparian areas damaged by camping. Dispersed riparian camping would be prohibited under Alternatives B and E, and Alternative D would likely result in little to no riparian camping.

Riparian areas would be protected from road construction and timber harvest by a buffer measuring 200 feet or to the extent of the 100-year floodplain under Alternatives B, C, D, and E.

Compared to the other alternatives, Alternatives C and D restore and develop riparian forests the most, especially the deciduous riparian forests of the alluvial stream areas that have been strongly affected by grazing.

Alternative A would not adopt any additional measures to restore or protect riparian areas and would keep grazing and camping at its present level. This alternative would have a continued negative impact to existing and potential riparian forests.

Effects to Other Plants

Noxious Weeds

Noxious weeds, which mainly inhabit roadsides and open fields at the Refuge, would be controlled using integrated pest management under all alternatives. The action alternatives (B, C, D, and E) incorporate direct measures to treat both roadsides and fields. The action alternatives would also attempt to curb the spread of noxious weeds indirectly through controls on grazing and horse use. All of the action alternatives incorporate the objective of reducing the extent of noxious weed infestation by half in 15 years.

Rare Plants

Under all alternatives, all known locations inhabited by rare plants would be monitored on a regular basis. Protections of known rare plant locations would also occur under all alternatives.

Inventories to find new locations of rare plants are planned under Alternatives B, C, D, and E. These alternatives would better protect Refuge populations of rare plants than would Alternative A, because a resource cannot be protected with certainty if its existence is unknown.

Effects to Water Quality and Aquatic Habitats

Water Quality

All alternatives would minimize the construction of new roads. In addition, Alternatives B, C, D, and E each would involve repair of roads that limit fish passage and or cause sedimentation to aquatic habitats, and the planting and stabilizing of devegetated or unstable streambanks. These measures would result in a reduction of direct sediment input to streams. Alternative A proposes no active measures to limit stream sedimentation except by minimizing new road construction.

Alternative B would eliminate grazing within the riparian zones. Riparian grazing would also be discontinued under Alternatives C and E. Alternative D eliminates grazing altogether. These restrictions would help to diminish soil compaction, streambank erosion, and fecal contamination of Refuge streams. Alternative A would not have these beneficial effects.

Alternatives B, C, D, and E each also propose forest management activities that would possibly involve some soil displacement. Forest harvest is also known to increase the magnitude and frequency of peak flows, especially in areas subject to rain-on-snow events. These effects are proportional to the number of acres harvested and the percent of canopy removed. Some short-term increases in peak flows with resultant potential effects to channel morphology are possible. In sum, Alternatives B, C, D and E would be likely to have a small negative short-term effect on water quality stemming from forest management activities. Over the long term, water quality should be enhanced as a larger percentage of the Refuge develops into mature structural stages.

Over the short term, Alternative A would not result in dramatic degradation or improvement of water quality. However, under this Alternative, the Refuge has a slightly higher likelihood of experiencing catastrophic wildfire. Wildfire could cause severe loss of vegetation cover and can increase soil surface water repellency for a short period.

Aquatic Habitats

Stream sedimentation, high road densities, loss of in-stream large wood, and loss of pool habitat have been cited as key factors involved in fish species declines in the inland northwest. Alternatives B, C, D, and E would be expected to have positive long term benefit to aquatic habitats, owing to passive and active measures taken in these alternatives to repair or obliterate eroding roads, replace culverts that block fish passage, restore streambank stability, and increase instream structural complexity.

Hydrologic changes at the Refuge would occur under Alternatives C, D, and E. Alternatives C and E would ensure that flows in the original channels of diverted streams take priority over diversion flows. In a low water year, this could result in positive benefits to stream conditions at the expense of the lake habitats. Alternative D goes farther, proposing to restore the natural hydrology altogether on the Refuge by breaching the dams and diversions that were built to establish Bayley and McDowell Lakes and Potter's Pond.

Aquatic habitats would realize an additional positive benefit under Alternatives B, C, D, and E, because grazing would be eliminated or conducted outside riparian areas.

Effects to Air Quality

Known and predictable air quality impacts would result primarily from smoke generated by forestry activities undertaken under Alternatives B, C, D, and E. Temporary impacts to air quality (mainly from particulates) can be expected from the prescribed burning and slash disposal.

Following smoke mitigation recommendations in the Fire Management Plan (Appendix G), the impacts from the proposed prescribed fire management program should be of relatively short duration and will mainly affect unpopulated areas of the Colville National Forest, east of the Refuge.

Effects to Selected Fish and Wildlife Evaluation Species

Rather than try to predict the effects to every species or rely on "guild" analysis, certain fish and wildlife species were selected, based on a variety of criteria, for more detailed analysis. A summary is provided below.

Bald Eagle: Foraging habitat for bald eagles could improve slightly under Alternatives B, C, and E, primarily due to improved aquatic habitats resulting in healthier fish populations. The level of recreational use that would be expected to continue near the lakes under Alternatives A, B, and E during the nesting season would probably preclude the possibility of eagles establishing a nest on the Refuge.

Alternative A would be expected to result in the most negative impact to bald eagles, due to the continuing degradation of riparian and aquatic habitats, loss of streamside vegetation, absence of active management to promote the development of large nest or roost trees, and the continuation of helicopter overflights by the Air Force within proximity of potential or occupied roost trees.

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Canada lynx: Alternative D would be expected to have the most benefit to lynx, since this alternative limits human access to the Refuge to the greatest extent, avoids roading and harvest in unlogged stands, eliminates Air Force training use, and allows some limited amount of wildfire to burn. Natural fire may enhance suitable lynx habitat by creating a mosaic of early successional habitat.

Alternatives B, C, D, and E each include forest management actions to promote the development of late successional characteristics on forest lands that benefit lynx. Alternatives B, C, D, and E would also provide benefit by implementing road closures between January 1 and April 15, a critical time for lynx.

In addition, Alternatives B, C, D and E eliminate snowmobile use on the Refuge benefitting lynx. Snowmobiles cause detrimental impact to this species through noise disturbance as well as packing snow on roads, which then enables competitor carnivores such as coyote and bobcat to enter lynx habitat (USFWS, 1998).

Under Alternative A, conditions for the lynx would be expected to continue to deteriorate. More visitors would arrive at the Refuge, road density and use would remain unregulated, human disturbances from recreationists and the Air Force would remain moderate to high and little to no forest management actions would be undertaken. Overall, adoption of Alternative A would represent a negative impact to the lynx.

Columbia Spotted Frog: Alternatives B, C, D, and E, which include measures to eliminate grazing in riparian areas and measures to restore streamside vegetation, would result in positive benefits for the spotted frog.

Alternative D would be likely to have the most positive benefit of the alternatives because it also eliminates fish stocking and restores the natural hydrology of the lakes. Under Alternative A, habitat conditions for the spotted frog would possibly deteriorate and would not improve.

Northern Goshawk: Forest thinning activities will occur within potential goshawk habitat under Alternatives B, C, D, and E. Forest management has the potential to cause short term deleterious effects to goshawks through reduction of canopy closure. Depending upon the prescription, thinning may temporarily reduce canopy closures below levels that support goshawk territories.

However, alternatives B, C, D, and E would all be expected to have (over the long term) a positive effect on goshawks, since the forest treatments identified in these alternatives would provide for a greater abundance of large trees, which are preferred for nesting.

Alternative A would be expected to have a neutral effect on the goshawk. No proactive measures would be taken to improve nesting opportunities on the Refuge, but foraging habitat would continue to be available.

MacGillivray's warbler: The MacGillivray's warbler represents passerine migrants that utilize woodland riparian and aspen habitats. Planting trees and shrubs in riparian areas as proposed in Alternatives B, C, D and E should have a positive effect by increasing the amount of woody shrub habitat available. Many of these riparian sites are vegetatively degraded due to many years of annual livestock grazing. The elimination of livestock grazing refuge wide (Alternative D), or in riparian areas (Alternative B), or only using grazing an occasional vegetation management tool (Alternatives C and E), should have a significant positive impact on habitat quality for MacGillivray's warbler and other wildlife species using riparian sites by speeding the recovery of these degraded areas.

Traditional camping sites next to streams have resulted in the loss of live riparian vegetation. The total elimination of camping on the refuge (Alternative C), or the elimination of dispersed recreational camping in riparian areas (Alternatives B and E) should result in the recovery of vegetation in these camping sites. Implementation of Alternative D would likely result in little to no riparian camping, with a similar positive result.

Common Goldeneye: Alternative D would eliminate much of the lacustrine habitat on the Refuge, by breeching dams and diversions. Under this alternative, goldeneye habitat would be reduced by about 115 acres.

The curtailment or elimination of riparian camping under Alternatives B, C, D, and E would benefit the goldeneye. Camping and other human uses disproportionately impact riparian areas on the Refuge and likely disturb or disrupt nesting or foraging goldeneyes and other species of waterfowl.

Overall, Alternative C would be likely to result in the most positive benefit to the common goldeneye, partly due to camping restrictions and partly because the delay in the fishing opener reduces disturbance to nesting waterfowl.

Alternatives A, B, and E are expected to have a negative effect on goldeneye since human disturbances at Refuge lakes would remain at mostly similar levels to those existing currently.

Flammulated owl: An associate of low to mid elevation mature ponderosa pine forests, this insectivorous owl benefits from actions that promote the development of large diameter ponderosa pines (for nesting) and a multilayered and relatively open canopy (for foraging) interspersed with dense thickets (for roosting). Because of the forest restoration efforts planned in low elevation forests under Alternatives B, C, D, and E, these alternatives would have the most positive effect on this species. Alternative A, which does not adopt forest restoration measures, would be expected to have a slightly negative effect on the owl.

White-tailed Deer: Alternatives B, C, D, and E each propose the reintroduction of low intensity fire in dry forest habitats. Underburning under the right conditions can stimulate sprouting and regeneration of browse species such as bitterbrush, thus benefitting the winter range habitats of the white-tailed deer. Alternative D also eliminates grazing and would eliminate the competition between these two groups for the forage resource.

Fields remaining from historic patterns of settlement currently provide rich sources of late winter early spring forage for deer, with the smallest fields providing forage in close proximity to secure cover. Alternatives B, C, and E each propose maintaining up to 400 acres of this habitat, with grasses maintained through cattle grazing program, mowing, or fire (Alternative B). Under Alternatives C and E, the openings would be maintained mainly through mowing or prescribed fire, incidental grazing may occur. In addition, Alternatives B, C, and E would maintain 200 acres as openings planted to crops for the benefit of wintering white-tailed deer.

Alternative A would allow grazing where it occurs presently (65% of the Refuge's open habitats are grazed). Under Alternative A, a greater number of acres would be available in grass forage, but competition between cattle and deer would likely diminish the quantity and quality of forage available to the deer slightly, and little would be done to slow the spread of noxious weeds.

Thirty-five miles of interior fencing, an impediment to wildlife passage that occasionally causes deer mortality, would be removed under Alternatives C, D, and E.

Alternatives C, D, and E would eliminate all disturbances associated with the Air Force. Alternative B would reduce the level of Air Force disturbance by eliminating wintertime use, limiting the number of Air Force personnel, and curtailing helicopter and off-road vehicle use.

Alternatives B, C, E, and especially D, would ensure road density levels remain at or below the standard recommended for big game. Enacting these closures would significantly reduce disturbance to deer, especially in the winter, when only the two county maintained roads would be open between January and April. This action could also reduce incidental poaching.

Although all of the action alternatives would benefit deer, overall, deer would probably be best served under Alternative C.

Pileated woodpecker: Alternatives B, C, D, and E would be expected to benefit the pileated woodpecker over the long term because the forest restoration efforts that are included in these alternatives would be expected to produce a higher density of large trees and snags that these woodpeckers use for feeding, roosting, and nesting. Alternative A would likely have a neutral effect.

Rainbow Trout: Changes in the livestock grazing program proposed under Alternatives B, C, D, and E would all be expected to have a positive effect on this species. Alternative D would potentially provide the largest benefit to the native redband rainbow, since stocking would cease under this alternative.

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Alternative D would potentially provide the largest benefit to the native redband rainbow, since stocking of all fish would cease under this alternative. Stocking does only occur in the lakes, but a small potential occurs for stocked fish to spill over into streams during high water (Shuhda, pers. comm.). Although it is highly unlikely ceasing stocking would cause the river fish to revert back to the "pure" and distinct native strains, ceasing stocking would at least have the benefit of not further polluting the gene pool. Strategies under Alternatives B, C, and E would include ceasing stocking of the eastern brook trout, but stocking of coastal rainbow would continue.

The riparian and stream restoration efforts undertaken under Alternatives B, C, D, and E would also aid the trout. Alternative A would be expected to result in a negative effect on rainbow trout since stream degradation from grazing, camping, and roads would continue.

Effects to Public Access and Recreation Opportunities

Public Access

The Refuge would have more controlled access under all alternatives except Alternative A. Alternatives B, C, and E would maintain an intermediate level of public access with eight maintained entrances; Alternative D would close all but four entrances. Seasonal road closures to reduce wintertime disturbance to wildlife would also be implemented under Alternatives B, C, D, and E.

Recreation Opportunities

General: Outdoor recreational use of public lands is on the increase nationwide, and, with the population growth in Stevens County and Spokane, the Little Pend Oreille NWR can probably expect increased visitation in the next ten years, even if an alternative is chosen that limits traditional uses of the Refuge such as camping. To a large extent the alternatives are designed to differentially channel human activities on the Refuge; each alternative strikes a different balance between the goal of meeting public demand for wildlife-dependent recreational opportunities and the goal of maintaining and restoring wildlife populations and habitats.

Under all action alternatives, many recreational activities would be reigned in or regulated in one form or another. All proposals to reduce or restrict recreational opportunities could cause increased pressure on other nearby public (or private) lands, particularly the Colville National Forest and Washington State Department of Natural Resources lands to the north, where numerous recreational opportunities exist. The extent of this displacement is difficult to predict at this time, though it is likely that users would seek recreation sites at similar distances from the major local population centers (Colville, Chewelah, Spokane) and that offer similar experiences (primitive campsites, lake fishing, etc.).

Hunting: Alternatives C and E would expand Refuge hunting opportunities, specifically offering the state seasons for spring turkey, grouse, and deer and elk bow hunts. Alternative D would restrict Refuge hunting, specifically banning bear, cougar, coyote, and bobcat hunts.

Hunting seasons would remain the same as at present under Alternatives A and B; some restrictions on camping would occur under Alternative B but these would probably negligibly affect hunting opportunities. Game and waterfowl would likely become increasingly difficult to find under Alternative A, due to the combined effects of disturbance from roads, unregulated camping, Air Force use, and lack of habitat management.

Fishing: Overall, the elimination and strong restrictions on camping under Alternatives C and D would probably result in far fewer visitors fishing at the Refuge under these alternatives. This could increase the quality of fishing, with larger fish in streams. However, under Alternative D, the dams maintaining Bayley and McDowell Lakes would be breached, and these areas would revert to seasonally moist wetlands. In addition, stocking would cease. The overall result would be a loss of fishing opportunities.

Alternatives C and E would promote catch and release fishing on the Little Pend Oreille River. Alternatives B, C, and E all seek to increase opportunities for natural spawning at the lakes. Alternatives A, B, and E continue the fishing seasons as they presently exist on the Refuge, while Alternative C would delay the fishing opener on Refuge lakes to favor waterfowl nesting.

Wildlife Viewing, Interpretation, Environmental Education, and Photography: It is not known to what extent visitors combine wildlife observation and photography with other activities at the Refuge such as camping, fishing, and hunting. However, people who exclusively come to the Refuge to view and photograph wildlife may be deterred to some extent by hunting, snowmobiling, Air Force overflights, and other noisy, disturbing activities. Thus it can probably be inferred that opportunities for these non-consumptive activities increase as these human disturbances decrease.

Overall, Alternative D would probably result in the least disturbance on the Refuge, followed by Alternative C. On the other hand, wintertime road closures under all of the action alternatives would limit vehicular access and thus increase potential viewing opportunities for certain publics. For those willing to walk, snowshoe, or ski, viewing opportunities could be greatly enhanced during this season under Alternatives B, C, E, and especially Alternative D. Alternatives C and E would emphasize visitor education and create both viewing areas and programs.

Camping: Camping opportunities would be curtailed under Alternatives C, D, and E, and, to some extent, B. Under Alternative C, camping would no longer be allowed. Alternative D would allow primitive (no-trace) camping in areas that vehicles cannot access; all vehicle accessible camps and campgrounds would be closed and restored to a natural condition. Dispersed riparian camping would be stopped under Alternatives B and E; these two alternatives would also permit camping only in certain designated campgrounds and dispersed sites during specific times of year. Alternative A would allow camping to continue in a largely unregulated fashion.

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Other recreational activities: Horseback riding would be eliminated under Alternatives C and D. Alternatives B and E could maintain or even increase horseback riding, but it would occur under the auspices of an equestrian plan that would deal with such issues as overnight use, trails, and horse feed.

Dirt bikes and unlicensed all-terrain vehicles would be prohibited from operating on the Refuge under all Alternatives. Snowmobile use would be eliminated under Alternatives B, C, D, and E.

Effects to Regional Economy (Stevens County)

Refuge Management Economics

The total regional employment and personal income effects of Refuge management would be greatest under Alternatives B and E. They would be smallest under Alternative D.

Forest Products Economics

Under Alternative A, 50-250 thousand board feet (MBF) would be harvested annually on the Little Pend Oreille NWR, consistent with recent harvesting levels and patterns. Under Alternatives B, C, and E, 100-1,000 MBF would be harvested annually, mostly through commercial thinnings designed to remove excess small trees from the forest understory. Under Alternative D, 250-500 MBF would be harvested annually.

Employment and income effects under the action alternatives would increase relative to Alternative A in proportion to the annual harvest level. Assuming that an average of 150 MBF is harvested annually under Alternative A, it is estimated that Refuge timber sales would account for a total of 0.3 jobs and $20,000 in personal income in the regional forest products industry. Total effects of Alternative A on employment and personal income are estimated at 0.6 jobs and $33,000 per year, respectively. Calculations were based on the assumption that an average of 375 MBF would be harvested annually under Alternative D, and that an average of 550 MBF would be harvested annually under Alternatives B, C, and E. Under the action alternatives, the direct and total economic effects of Refuge timber harvesting would increase in proportion to the harvest level.

Livestock Production Economics

Under Alternative A, forage to support approximately 750 AUMs would continue to be sold to local permittees (there are currently 4 permits), and it was assumed that this level of forage sales would support the annual sale of 180 calves, for a total sales weight of 108,000 pounds (1,080 hundred weight).

Under Alternative B, grazing would be restricted to upland forest areas, which provide approximately 300 AUMs during the grazing season. Under Alternatives C, D, and E, livestock grazing would be phased out over the next 5 years, except for incidental grazing (under

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Alternatives C and E only) to achieve wildlife objectives. For this analysis, it was assumed that no forage would be sold to permittees under Alternatives C, D, and E.

Under Alternative A, Refuge forage supply would account for an estimated 1.9 jobs and $62,000 in personal income in the range-fed cattle industry, and a total of 3.0 jobs and $96,000 in personal income throughout the regional economy. Under the other alternatives, direct and total employment and income effects of grazing would decline in proportion to the amount of forage sold on the Refuge.

Eliminating Refuge grazing would increase production costs for the affected permittees, and could result in herd reductions for one or more permittees. For example, if no alternative forage sources were available, permittees could be forced to reduce their herd sizes by the number of head grazed on the Refuge. Under a worst-case scenario, such herd reductions could reduce the size of the permittee's overall operation below the minimum size needed for a cow-calf operation to be viable. In this case, phasing-out of Refuge grazing could result in the closure of one or more local cattle operations, and could lead to a reduction in regional calf sales by more than the approximately 180 head annually produced on the Refuge.

Recreation Economics

Consistent with historical trends, total recreation use on the Refuge is projected to increase over time under the No-Action Alternative. Under Alternative B, participation rates would increase as fast as under Alternative A. Under Alternative C, hunting and wildlife and nature observation would increase faster than under Alternative A, fishing use would remain constant, and other types of use (primarily camping and horseback riding) would be eliminated. Under Alternative D, hunting use would increase relatively slowly, wildlife and nature observation would increase relatively rapidly, and fishing and other uses would decline substantially over the next five years. Under Alternative E, hunting and fishing use would increase slightly faster than under Alternative A, while wildlife and nature observation and other uses would increase slightly slower.

Economic effects of recreation were analyzed based on projected Refuge use levels in 2003. Under Alternatives A and B, Refuge recreation use would account for an estimated 16.5 jobs and $327,000 in personal income. Under Alternative E, recreation-related economic effects would be roughly the same as under the No-Action Alternative. Under Alternatives C and D, the employment and income effects of all Refuge recreation would be approximately three-fourths as large as under the No-Action Alternative.

Under Alternatives A, B, and E would produce a total net economic value of approximately $1.17 million. Net economic value would be roughly $872,000 under Alternative C and $809,000 under Alternative D.

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Air Force Training Economics

Under Alternatives B and E, use of the Refuge by the Air Force Survival School would be reduced. Under Alternatives C and D, it would be phased out over the next 5 years. Because of the small level of regional expenditures related to Air Force training on the Refuge however, the regional economic impacts of reducing or phasing out this program would be negligible.

Economic Summary

Employment: Under the No-Action Alternative, economic activity directly related to all Refuge operations would account for an estimated 26.9 jobs. Including direct and indirect effects, all Refuge operations would account for 45.4 jobs. Among the other alternatives, Alternative B would result in the greatest employment effects, while Alternative D would result in the smallest employment effects. Refuge recreation use would account for the greatest employment effects, followed by Refuge management. Employment effects associated with timber harvesting and forage production would be relatively small.

Relative to the No-Action Alternative, Alternatives B and E would result in a net increase in employment, while Alternatives C and D would result in a net decrease.

Personal Income: Relative to the No-Action Alternative, aggregate personal income would increase under Alternatives B and E and would decrease under Alternative D. Alternative C would result in a small direct increase in personal income relative to Alternative A, but a decrease in the total personal-income effect.

Net Economic Value: Net economic value resulting from recreation use would total approximately $1.17 million per year under Alternatives A, B, and E. Under Alternatives C and D, net economic value would be substantially lower.

The table below illustrates the overall effects to Refuge habitats and species, programs, and the regional economy. An effect is rated positive (+) if the resource would be increased in quantity, quality, or protection. An effect is rated negative (-) if the opposite is true. An effect is rated neutral (N) if there would be no discernable trend towards improvement or deterioration of the resource, or if positive and negative effects cancel each other out. Where short-term and long-term effects differ, they are presented separately.

Effects of Management Changes on Refuge Resources, Programs, and Regional Economy

Resource	**Anticipated Effect under Alternatives**				
	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Habitats					
Coniferous Forests	-	+	+	+	+
Riparian and Deciduous Forests	-	+	+	+	+
Water Quality - short term	-	-	-	-	-
- long term	-	+	+	+	+
Aquatic Habitats	-	+	+	+	+
Air Quality	-	-	-	-	-
Species					
Noxious Weeds	+	-	-	-	-
Rare Plants	+	+	+	+	+
Bald Eagle	-	N	+	N	N
Canada Lynx	-	+	+	+	+
Columbia Spotted Frog	-	+	+	+	+
Northern Goshawk - short term	N	-	-	-	-
- long term	N	+	+	+	+
MacGillivray's Warbler	-	+	+	+	+
Flammulated Owl - short term	N	N	N	N	N
long term	-	+	+	+	+
Common Goldeneye	-	-	+	-	-
White-tailed Deer	-	+	+	+	+

Resource	**Anticipated Effect under Alternatives**				
	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Pileated Woodpecker - short term	-	-	-	-	-
- long term	-	+	+	+	+
Rainbow Trout (native)	-	+	+	+	+
Ruffed Grouse	-	+	+	+	+
Hoary Bat	N	+	+	N	+

Other					
Air Force Survival School	N	-	-	-	-
Cultural Resources	N	N/+	+	+	N
Regional Economy (relative change from No-Action Alternative)					
Refuge Management		+	+	-	+
Forest Products		+	+	+	+
Livestock		-	-	-	-
Recreation		-	-	-	-
Overall Economic Effect		+	-	-	+

Cumulative Effects

There is a clear trend on the part of the federal land management agencies to return regional landscapes to a pattern more closely approximating the historic range of variability. This would include projects to accelerate the development of large trees in forests across the region by thinning from below and use of prescribed fire for the purposes of reducing high fuel loads.

The combination of these region-wide actions (which would also occur at the Little Pend Oreille NWR under action Alternatives B, C, D, and E) could result in short-term effect on air quality caused by burning excess fuels, a cumulative long-term positive effect for plants and animals dependent on mature and late-successional forests, and regional timber markets may be flooded with small-diameter timber, depressing prices and rendering many of the fuel reduction projects non-viable by commercial operators. The combination of recreational and Air Force disturbances under Alternative A could cause cumulative impacts to sensitive wildlife.

Little Pend Oreille NWR is a minor contributor to the regional livestock industry, yet the proposals to decrease or eliminate the grazing program could potentially add to an already declining situation for the local cattle industry. The Colville National Forest provides another major opportunity for grazing on public lands, but, given that the Forest is considering a reduction in livestock grazing for similar reasons, Refuge permittees (of which there are 4) could experience a cumulative "squeeze".

Potential Irretrievable and Irreversible Commitments

The dedication of areas to main arterial roads (all Alternatives) and maintaining campgrounds and campsites (Alternatives A, B, D, and E) represents an irretrievable loss of natural productivity by the Refuge.

Maintaining fields in all Alternatives except Alternative D would represent an irretrievable loss of native forested habitat.

Under Alternative A, there would be no attempt to manage excess fuels. Fire suppression would occur under all Alternatives, but would be steadfastly practiced under Alternative A. Alternative A would thus result in an irretrievable loss of habitat value for those species requiring an open understory and an overstory dominated by larger, more scattered trees.

Relationship Between Short - Term Uses of Man's Environment and Enhancement of Long Term Productivity

All of the action alternatives of this draft Comprehensive Conservation Plan/EIS are clearly aimed at enhancing the long-term productivity of the Refuge; that is, enhancing the habitat quality and quantity for native species. Existing uses that have been deemed incompatible (See Appendix F) will be eliminated or modified under the preferred Alternative E. Alternative C, D, and E adopt the most measures to enhance long-term productivity. Alternative B accommodates more existing short term human uses (specifically grazing and the Air Force Survival school), but also enacts sideboards to at least partially mitigate the effects of these uses on the long-term productivity. In summary, all action alternatives improve the enhancement of long-term productivity. The No-Action Alternative would allow long-term productivity to be compromised and further degraded.

Unavoidable Adverse Environmental Effects

The preferred alternative (Alternative E) is not expected to result in any unavoidable adverse environmental effects. Habitat and species monitoring that will be undertaken as part of the preferred alternative will enable Refuge staff to adapt management policies to any unforeseen situations.

Chapter 1: Introduction, Purpose of and Need for Action

1.1 INTRODUCTION

This Integrated Draft Comprehensive Conservation Plan and Draft Environmental Impact Statement (DEIS) for the Little Pend Oreille National Wildlife Refuge combines two documents required by federal laws: a Comprehensive Conservation Plan (CCP) required by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) (Refuge System Improvement Act) and an Environmental Impact Statement (EIS) required by the National Environmental Policy Act of 1969.

The Comprehensive Conservation Plan portion of the document will be used as a tool by the refuge staff and other partners in Refuge management and restoration. The Plan will guide management decisions over the next fifteen years and identify strategies for achieving Refuge goals and objectives. The DEIS portion of the document describes a range of alternatives, including the preferred alternative, for managing the refuge. The integrated document is divided into 6 chapters including: Chapter 1) Introduction, Purpose of and Need for Action; Chapter 2) Alternatives, Objectives, and Strategies; Chapter 3) Affected Environment; Chapter 4) Environmental Consequences; Chapter 5) Consultation and Coordination; and 6) List of Preparers. Appendices provide supporting information for the draft EIS, as well as a step-down fire management plan and a project level plan. Appendix C provides project proposals and cost information for the preferred alternative.

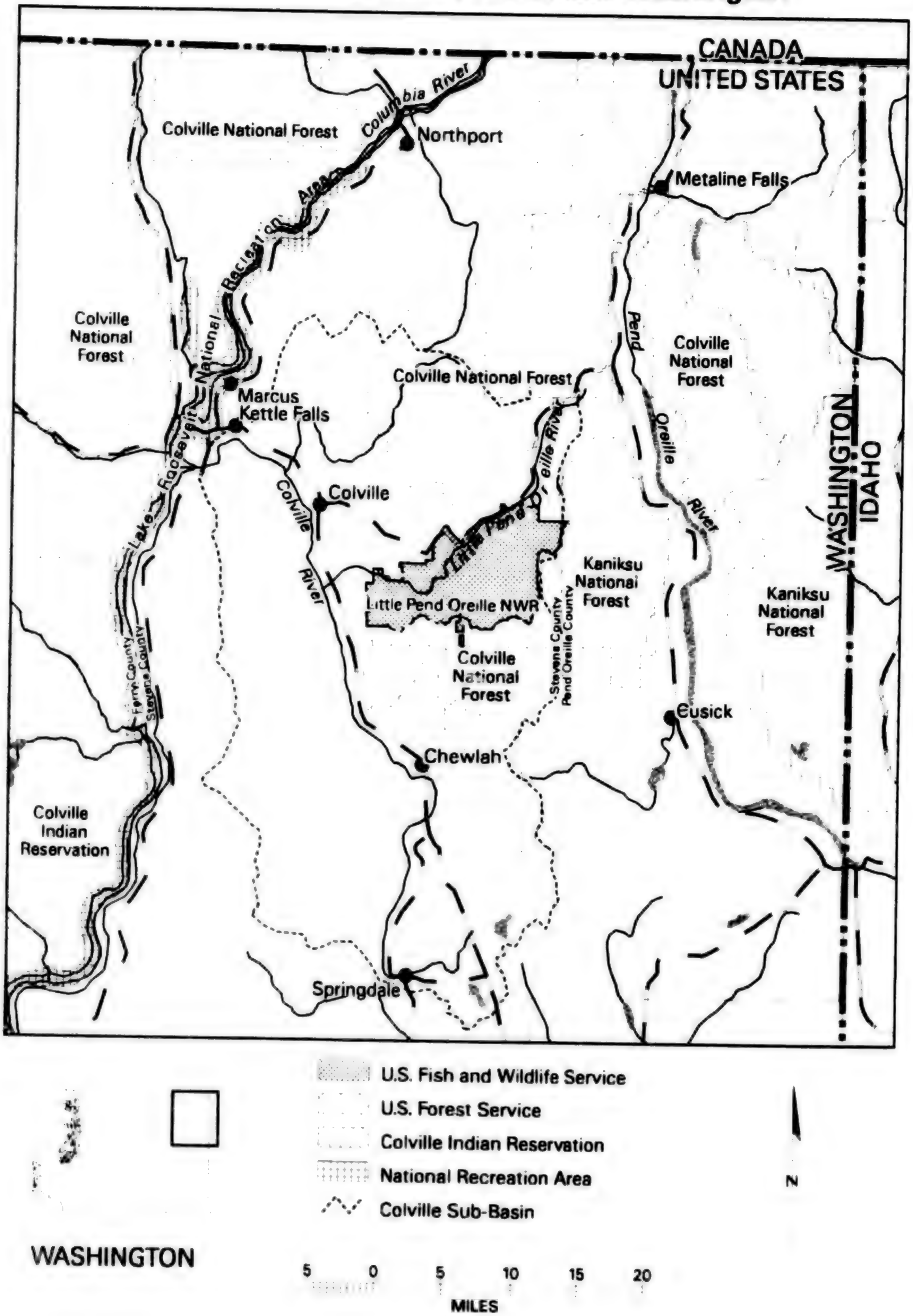
1.2 PROPOSED ACTION

The proposed action is to develop a Comprehensive Conservation Plan for the Little Pend Oreille National Wildlife Refuge that best achieves the unit's purpose, vision and goals; contributes to the System mission: addresses the significant issues and relevant mandates, and is consistent with principles of sound fish and wildlife management.

1.3 PURPOSE OF AND NEED FOR COMPREHENSIVE CONSERVATION PLAN

Little Pend Oreille National Wildlife Refuge, located in northeastern Washington, was established in 1939 (see Map 1). It is one of more than 500 refuges in the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (Service). Overall, there is a need to bring the Refuge in line with the new National Wildlife Refuge System mission, goals and policies. A Comprehensive Conservation Plan, required by the Refuge System Improvement Act, is needed to address ". . . significant problems that may adversely affect the populations and habitats of fish, wildlife and plants and the actions necessary to correct or mitigate such problems." Specifically, these problems at the Refuge include: ensuring the biological integrity, diversity and environmental health of Refuge forests; the need to restore degraded stream habitats; the need to evaluate and manage visitor use; and the need to resolve conflicts between

Map 1. Little Pend Oreille NWR, Northeast Washington



Air Force use of the Refuge and the Refuges's wildlife purpose. In addition, the Refuge System Improvement Act requires the Service to consider increasing opportunities for people to experience wildlife-dependent recreation. The purpose of this Comprehensive Conservation Plan is to develop a vision for the Refuge and provide management guidance through maintenance, restoration, and use of Refuge resources during the next 15 years. Specifically, the Plan will:

- set a long term vision for the Refuge
- establish management goals, objectives and strategies
- define compatible recreational uses of the Refuge
- determine appropriate level of use of livestock grazing
- determine Air Force Survival School training use of the Refuge
- outline habitat and public use projects that support the goals and objectives
- identify public entry points into the Refuge
- describe forest habitat management
- adopt a step-down fire management plan
- adopt three step-down forest habitat management project plans

The purpose of the Draft Environmental Impact Statement (DEIS) is to describe alternative plans for managing the Little Pend Oreille National Wildlife Refuge. The DEIS shows a range of alternatives considered during the planning process and evaluates the possible environmental effects of the various alternatives on the natural, social, cultural, and economic environment.

The Comprehensive Conservation Plan provides a framework for future Refuge management. The environmental analysis of this plan is addressed at the conceptual planning level and is not a detailed site plan and does not have exact locations for facilities or precise descriptions of programs. An exception to this is the forest habitat management prescriptions for three areas in the dry forest zone: 1) Starvation Flats; 2) Minnie Flats; and 3) Biarly Flats, for which analysis of the associated potential environmental impacts are analyzed in more detail. The public will be informed of major changes.

1.4 PLANNING PROCESS AND FUTURE REVISIONS

The process followed for development of this Comprehensive Conservation Plan was guided by the Refuge Planning Chapter of the Fish and Wildlife Manual (Part 602 FW2.1, November 1996) and evolving policy related to the Refuge System Improvement Act. Key steps included: 1) preplanning; 2) identifying issues and developing vision; 3) gathering information; 4) analyzing resource relationships; 5) developing alternatives and assessing environmental effects; 6) identifying a preferred alternative; and 7) publishing the draft plan. The next steps in this process include: 8) documenting public comments on the draft plan; 9) preparing the final plan; 10) securing approval of the Regional Director; and finally, 11) carrying out the plan. While the life-span of the plan is 15 years, periodically the Service will review the plan. The Plan may be amended as necessary at any time under an adaptive management strategy.

Public involvement is sought throughout the planning process, using meetings, open houses, newsletters, surveys, and other communication tools. Other agencies involved in discussions related to this document include the U.S. Forest Service, National Park Service, U.S. Air Force, Natural Resource Conservation Service, Washington Department of Fish and Wildlife, and Washington Department of Natural Resources. Details of scoping and public involvement are provided in Chapter 5.

The Comprehensive Conservation Plan is one of several plans necessary for Refuge management. The CCP provides guidance, in the form of goals, objectives, and strategies, for several refuge program areas but may lack some of the specifics needed for implementation. Step-down management plans will be developed for individual programs areas within approximately five years after CCP completion. All step-down plans require appropriate NEPA compliance. Other step-down plans and their priority order, for Little Pend Oreille NWR include:

Step Down Management Plan	**Status**
• Occupational Safety and Health Plan	Available
• Fire Management Plan	Available
• Public Use Management Plan (PUMP) - hunting - fishing - visitor services and outreach - law enforcement - interpretation and environmental education - other recreational activities	By 2005
• Wilderness and Special Areas Management Plan	With PUMP
• Habitat Management Plan (HMP) - wetland, water, riparian - forest management - integrated pest management	By 2005
• Fish and Wildlife Population Management - inventory and monitoring	With HMP

Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans.

1.5 LEGAL AND POLICY GUIDANCE

Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the designated purpose of the Refuge unit as described in establishing legislation or executive orders, Service laws and policy, and international treaties. Key concepts and guidance of the System are covered in the NWRS Administration Act of 1966, the Refuge Recreation Act of 1962, Title 50 of the Codes of Federal Regulations, the Fish and Wildlife Service Manual, and, most recently, through the National Wildlife Refuge System Improvement Act of 1997.

The Refuge System Improvement Act amends the Refuge System Administration Act of 1966 by including a unifying mission for the Refuge System, a new process for determining compatible uses on refuges, and a requirement that each refuge will be managed under a Comprehensive Conservation Plan. The Refuge System Improvement Act states that wildlife conservation is the priority of NWRS lands and that the Secretary of the Interior shall ensure that the biological integrity, diversity, and environmental health of refuge lands are maintained. Each refuge must be managed to fulfill the Refuge System mission and the specific purposes for which it was established. Additionally, the Act identifies six wildlife-dependent recreational uses. These are hunting, fishing, wildlife observation and photography, environmental education and interpretation. As priority public uses of the Refuge System, these uses will receive enhanced consideration over other uses in planning and management.

Lands within the national wildlife refuge system are different from other, multiple-use public lands in that they are closed to all public uses unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgement of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Sound professional judgement is further defined as a decision that is consistent with principles of fish and wildlife management and administration, available science and resources, and adherence with law.

The Refuge System Improvement Act requires that a Comprehensive Conservation Plan be in place for each refuge by the year 2012 and that the public have an opportunity for active involvement in plan development and revision. It is Service policy that CCPs are developed in an open public process and that the agency is committed to securing public input throughout the process.

1.6 NATIONAL WILDLIFE REFUGE SYSTEM MISSION AND GOALS

The mission of the National Wildlife Refuge System is:

> *"To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and pla[illegible]ces and their habitats within the United States for the benefit of present and future*

generations of Americans." (National Wildlife Refuge System Improvement Act of 1997.)

Starting with the first refuge, Florida's Pelican Island, established in 1903 by President Theodore Roosevelt, the NWRS has grown to more than 92 million acres in size. It includes more than 500 refuges, at least one in every state, and over 3,000 Waterfowl Production Areas. The needs of wildlife and their habitats come first on refuges, in contrast to other public lands managed for multiple uses.

The goals of the National Wildlife Refuge System (Fish and Wildlife Manual Part 602 FW 1.4M) are:

Goal 1: To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened with becoming endangered;

Goal 2: To perpetuate the migratory bird resource;

Goal 3: To preserve a natural diversity and abundance of fauna and flora on refuge lands; and

Goal 4: To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment and provide visitors with high quality, safe, wholesome, and enjoyable recreation experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

1.7 COLUMBIA BASIN ECOREGION GOALS

The Little Pend Oreille is located within the Service administrative boundary of the Columbia Basin Ecoregion and is expected to fulfill ecoregion goals, which are:

Goal 1: *Conservation of Ecosystems*

Prevent species decline, expedite recovery of candidate, threatened and endangered species, and preclude future species listings by conserving and restoring a diversity of native fish, wildlife and plant species and their habitats in the Columbia River Basin.

Goal 2: *Internal Efficiencies and Development*

Develop a motivated, well-trained and diverse work force that responds to the ecosystem's demands for interdisciplinary talents and expertise.

Goal 3: *Public Involvement*

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Develop an educated and informed constituency that is proactive in protecting and restoring the ecosystem.

1.8 BRIEF HISTORY OF REFUGE ESTABLISHMENT, ACQUISITION, AND HISTORICAL MANAGEMENT

Beginning in 1879 and continuing until 1931, 188 homestead claims were patented within the Refuge boundaries. For some claims, "homesteaders" may have been working for lumber logging companies, staking claims, and then turning over the land to the company. Many settlers sold timber off their claims and kept title to the land after they harvested the timber. They established orchards, gardens, and pastures on many cleared claims. When the Depression hit in the 1930s, many homesteaders had already given up and moved from the area. The short growing season, harsh winters, and overgrazed conditions were factors that led to the Resettlement Administration classifying the land as "submarginal." In 1935, most of the homesteads were acquired as public lands for rehabilitation purposes. The program purchased land outright or traded for parcels in more productive areas.

Executive Order 8104 (May 2, 1939) established the Little Pend Oreille Wildlife Refuge ". . . *as a refuge and breeding ground for migratory birds and other wildlife . . .* ". Lands added later to the refuge were acquired under the authority of the Migratory Bird Conservation Act (16 U.S.C.715d) ". . . *for use as an inviolate sanctuary, or for any other management purpose, for migratory birds*." On July 27, 1940, Proclamation No. 2416 changed the name to Little Pend Oreille National Wildlife Refuge.

From 1939 until the middle of 1965, the U.S. Fish and Service managed the Refuge. Early management focused on restoring degraded habitat conditions to improve habitat for deer, fur bearing animals, upland game birds, waterfowl, and fish. Considerable effort went into planting a variety of shrubs and grasses to benefit wildlife, managing horse and cattle grazing, and planting crops to feed deer and game birds. Management ignited fires and selectively cut forests to improve deer winter range.

In 1965, the Washington Department of Fish and Wildlife (known then as the Washington Department of Game) assumed management responsibility through a cooperative agreement with the Service. Although the Service provided a budget to manage the Refuge, the State had considerable latitude to manage the area primarily for game species and recreation. The State scheduled most of the Refuge for selective timber harvest on a continual rotation basis to provide the "most benefits to wildlife," which included deer, forest grouse, snowshoe hare, bear and game farm pheasants. Most farming ceased in the mid-1980s. From 1986 until 1994, no timber sales were undertaken. Public use increased under state management and the area became known locally as the Game Range. The state also promoted snowmobiling, camping, and horseback riding.

A land exchange with the Washington Department of Natural Resources in 1967 (Map 2), consolidated state and Refuge ownership. Federal lands on the northeastern part of the Refuge were exchanged for state inholdings on the remainder of the Little Pend Oreille, establishing the present Refuge boundary. The exchange modified the approved Refuge boundary and changed management jurisdiction, however, the original executive order boundary still exists.

Prompted by an internal audit by the General Accounting Office, the Service decided to resume on-site management at several refuges throughout the country. This led the Service to resume management of the Little Pend Oreille National Wildlife Refuge in 1994.

1.9 REFUGE PURPOSE

National Wildlife Refuge System lands are acquired under a variety of legislative acts and administrative orders. The Service defines the purposes of national wildlife refuges when a refuge is established. The two methods used in establishing Little Pend Oreille NWR were executive withdrawal from the public domain (executive order) and acquisition funded through the Migratory Bird Act. Little Pend Oreille National Wildlife Refuge was established ". . . as a refuge and breeding ground for migratory birds and other wildlife . . . " (Executive Order 8104) and ". . . for use as an inviolate sanctuary for migratory birds." (Migratory Bird Conservation Act). These purposes form the foundation upon which management decisions are made and goals, objectives, and strategies are developed.

Based on review of acquisition authorities and supporting documentation, the purpose for Little Pend Oreille NWR has been clarified. The Refuge purpose is:

To conserve habitats for migratory birds and all other native fish and wildlife.

What follows describes some of the legislation and policy supporting this interpretation. Refuges are managed under a dominant use philosophy. Wildlife and wildlife-dependent recreation are the dominant uses of refuges. Purpose statements identify the wildlife species or groups of species that receive management emphasis. Since its early history, white-tailed deer and other game species received management emphasis on Little Pend Oreille NWR and thus became the "other wildlife" referred to in the purposes. Rehabilitation of degraded wildlife habitats and protection of deer winter range were primary goals during early refuge years. While white-tailed deer winter range and ultimately deer populations may benefit from future management approaches, they are only one of many fish and wildlife species now considered important to protect on the Refuge.

Curtain (1993) in his review of the history of the National Wildlife Refuge System, indicates that the original intent of the term "inviolate sanctuary" is found in the Migratory Bird Conservation Act (first passed in 1918 as the Migratory Bird Treaty Act and amended in 1934 and 1938). This Act originally required that all refuges be inviolate sanctuaries and deemed that refuges' primary purposes were as breeding ground and habitat for migratory birds. Migratory bird hunting was prohibited on migratory waterfowl areas by the Act but most other human uses were not

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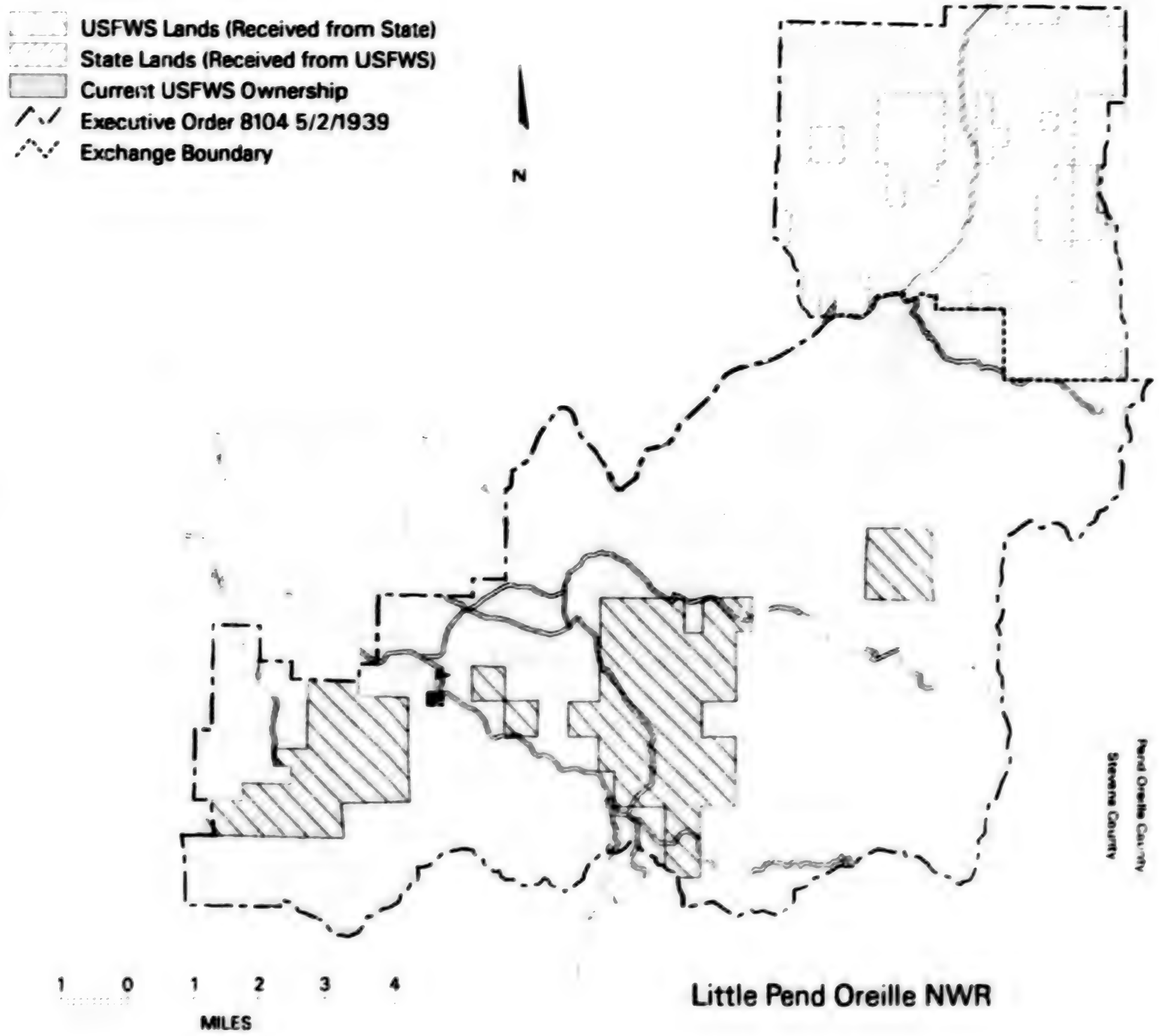
Map 2. Land Exchange with the State of Washington (1967)



Ron Beitel, 12 April 1999, f:\lpo\ \landexch.b+w addressed. The 1938 amendment to the Act gave refuge managers authority to decide if, when, and how bird hunting would be allowed. After World War II, public demand for opening refuges to recreation increased. The 1949 Duck Stamp Act allowed waterfowl hunting on all refuges, but restricted the percentage of each refuge open to hunting.

A Department of Interior solicitor's opinion memorandum, dated May 19, 1964, describes criteria for determining whether a wildlife refuge is an inviolate sanctuary for migratory birds. "All land areas acquired as wildlife refuges for migratory birds with Duck Stamp Funds (Migratory Bird Conservation Funds), are inviolate sanctuaries." ". . . only 40% of the area purchased with Migratory Bird dollars may be opened at one time for hunting of migratory game birds or resident species of birds." On Little Pend Oreille NWR, 2,251 acres were purchased with these funds and fall within the "inviolate sanctuary" provision. These areas include lands and waters surrounding Dailey Lake, McDowell Lake, Bayley Lake and portions of the Little Pend Oreille River and Bear Creek (Little Pend Oreille Wilderness Study Report 1973). To comply with the Migratory Bird Act and its inviolate sanctuary provision, all Refuge streams are closed to duck and dove (migratory game bird) hunting.

The Refuge Recreation Act of 1962 further defined how recreational uses on refuges would be evaluated and firmly established the concept of compatibility. The 1966 Refuge System Administration permitted "the use of any area within the system for any purposes, including but not limited to hunting, fishing, public recreation and accommodations," as long as "such uses are compatible with the major purposes for which such areas were established." Typically, a refuge is closed to a particular use until it is opened administratively through the Federal Register. Refuge managers must determine compatibility of all public, economic, and military uses proposed or occurring on a refuge. The 1997 National Wildlife System Improvement Act amended the Refuge System Administration and further defined priority uses to be the following six wildlife-dependent uses: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Existing compatibility policy is described in the Refuge Manual (5 RM 20). New compatibility policy is being developed to support provisions of the National Wildlife Refuge System Improvement Act. Compatibility determinations for existing and proposed uses for Little Pend Oreille are in Appendix F.

1.10 REFUGE VISION STATEMENT

Forest habitat management is vital to the future of wildlife conservation in northeastern Washington. Little Pend Oreille is unique in its representation of 5 distinct forest zones. Also, as the only mixed-conifer montane forest in the National Wildlife Refuge System, Little Pend Oreille National Wildlife Refuge has an important role to play in forest habitat management. The Refuge's 40,198 acres of forests, streams, and wetlands are used seasonally by bald eagles and numerous nesting and foraging migratory birds. It provides critical winter range for deer and habitat for several species of interest.

The Refuge envisions using its Comprehensive Conservation Plan to build on native wildlife habitat diversity as a theme with emphasis on developing late successional forest and restoring riparian habitat - habitats that are increasingly rare in the region. In the next 15 years, Refuge staff will focus management efforts in over-stocked stands of dry forest using thinning and prescribed fire techniques that mimic natural ecological processes such as wildfire. Degraded streams will be restored to enhance and maintain the natural diversity of the Refuge.

A healthy refuge environment will provide opportunities for visitors to enjoy wildlife viewing, hunting, and fishing in a natural setting. Interpreting wildlife and the Refuge's unique heritage, as well as improving facilities will enhance the visitors' experience while protecting the cultural integrity of the area. To meet these challenges, the U.S. Fish and Wildlife Service will seek partnerships with other agencies, interest groups, landowners, and local communities. Refuge staff will work with adjacent forest managers to protect local watersheds and wildlife corridors. These efforts will result in greater protection of wildlife and fish resources throughout northeastern Washington.

1.11 REFUGE GOALS

Three broad goals are proposed for the Little Pend Oreille NWR. They are consistent with the Refuge purpose, Ecoregion goals, NWRS goals, the National Wildlife Refuge System Improvement Act of 1997, Service policy, and international treaties.

For each goal, the Refuge developed management principles and guidelines. These statements of assumptions or principles were used to further support the Refuge goals. These principles and guidelines were helpful in developing objectives and strategies, especially for the preferred alternative. They are presented below, following the goals to which they apply.

Goal 1: ***Conserve, enhance and restore native forest, riparian, in-stream, and wetland habitats representative of the native habitat diversity of northeastern Washington.***

- Healthy, high quality habitats are key to healthy fish and wildlife populations.

- Native conditions that existed during the mid-1800's provide a reference point for comparison with existing conditions. The assumption is that at this point in time ecological processes were operating at a natural frequency and intensity and were not influenced as much by human disturbances (land clearing, fire suppression, etc.) as they are today.

- Restoration of native conditions is a desired direction for management but may not always be achieved in the short term because soils or other environmental factors may be altered so they no longer support native species.

- Active management to restore and maintain native conditions is desirable

- Forest habitat management goals and objectives will take longer than the life of this plan (15 years) to achieve.

- Native assemblages of fish and wildlife are best maintained and restored by aiming to provide native habitat diversity typical of the ecoregion prior to European settlement.

Goal 2: ***Monitor, protect, and recover special status plants and animals and species of management interest.***

- Wildlife populations will be managed primarily through habitat management.

- The needs of fish and wildlife have priority over public uses of the Refuge.

Goal 3: ***Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.***

- Wildlife-dependent recreational activities, as identified in the National Refuge System Improvement Act of 1997, will be given enhanced consideration over other uses. These activities are hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

- Some existing artificial habitats (e.g., ponds and lakes) are desirable because they provide benefits to native wildlife, help offset overall wetland losses, and offer increased wildlife-dependent recreational opportunities.

1.12 PLANNING ISSUES AND OPPORTUNITIES

In considering the key issues facing the Refuge under the Comprehensive Conservation Plan, staff solicited comments from the public, a plan working group consisting of primary stakeholders, other federal and state agencies, and other Fish and Wildlife Service employees. A mailing list of approximately 500 persons and organizations is maintained at the Refuge and was used to distribute planning updates and public meeting announcements. A summary of public involvement efforts is presented in Chapter 5. Under the National Environmental Policy Act (NEPA), federal agencies may identify numerous issues. However, only those that are considered "significant" are allowed to drive the formulation of alternatives. Based on the scoping efforts undertaken, the following significant issues were identified for the Little Pend Oreille NWR:

Issue 1. Protection and restoration of habitat values for native wildlife, fish, and plants

Little Pend Oreille is the largest National Wildlife Refuge in Washington state and is also the only one with a mixed conifer forest. The Refuge extends from low alluvial bottomlands once covered in rich riparian forest to peaks 5,600 feet in height. With this elevational diversity, the Little Pend Oreille contains a complete set of Northeast Washington's diverse forest vegetation zones.

Protected under the conservation mandates of the National Wildlife Refuge System, these habitats are highly valuable to native species. Prior to establishment of the Refuge, old growth ponderosa pine was logged and, in some places, forests were converted completely to fields, particularly in riparian areas. Wetlands were flooded and streams diverted. Natural fire was suppressed and exotic species became established. Focus on game management resulted in non-native species introductions while the needs of native non-game wildlife was accorded low priority. People made use of the Refuge for a variety of non-wildlife-dependent activities.

Rising public concern over dwindling fish stocks and diminished habitats available for native wildlife have spurred recent federal commitments to practice "ecosystem management". National Wildlife Refuges are enjoined to protect and restore habitat for wildlife. The Refuge System Improvement Act states that wildlife-dependent uses take precedence over other non-wildlife-dependent uses.

Issue Summary: In light of the laws and the current state of the resources, what kinds of management actions should be undertaken to protect and restore native habitats? Should the refuge practice active management to benefit wildlife, including forest thinning, prescribed fire, stream restoration, weed control, and road closures?

Issue 2. Providing compatible public recreation opportunities

National and local interest in outdoor recreation has been steadily increasing. Longtime users of the refuge include people who hunt, fish, camp, and horseback ride. Others come to ride mountain bikes, snowmobile, or watch wildlife. Sometimes, different recreational uses can be in conflict with each other, as well as compromising the refuge's primary goal of wildlife conservation. Yet the recently enacted Refuge System Improvement Act for the nation's wildlife refuges emphasized that six wildlife-dependent recreational uses should be maintained or encouraged, if they do not threaten wildlife conservation goals. These six priority public uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Issue Summary: What recreational activities are appropriate at Little Pend Oreille Refuge? If appropriate, what guidelines are needed to assure that these activities are compatible with restoration and maintenance of refuge biological integrity and diversity?

Issue 3. Cattle grazing on riparian and upland allotments

Sixteen allotments for cattle grazing, held by four permittees, are designated across the Refuge. The allotments currently support up to 750 Animal Unit Months (AUMs - equivalent to one cow/calf pair), although in the past, permits granted grazing privileges for up to 1,100 AUMs. The designated allotments cover the entire Refuge but in practice, most cattle grazing occurs in the alluvial riparian zone, meadows, former farm fields, and low-elevation forest. While grazing provides some benefits to deer by encouraging early spring growth and improving the palatability of grasses and other plants, there are some significant negative effects. Aquatic and riparian concerns include stream bank erosion, fecal contamination of Refuge aquatic habitats, and browse-induced inhibition of tree and shrub growth in riparian zones. Other problems associated with grazing include soil compaction, competition with native ungulates for desirable forage and cover areas, suppression of aspen, and conflicts with recreational uses. Degraded areas need time to recover. If existing uses are modified, there could be negative economic repercussions to current permittees.

Issue Summary: What methods and intensity of livestock grazing is compatible with the Refuge purpose and goals?

Issue 4. Air Force Survival School Training

The U.S. Air Force uses the Refuge annually for survival training. Use is concentrated in late summer, when an average of about 90 Air Force personnel may be on the Refuge at any given time. They use the central portion of the Refuge; the same areas where other Refuge uses are focused. These training activities promote survival skills. The air crews and survival instructor trainees learn how to get food from the land, build shelters and fires, orient, and evade capture. Students direct helicopters to navigation points to assist in rescue exercises. To assure greater safety for their personnel, the Air Force requested and received a public hunting closure from the Washington Department of Fish and Wildlife when the State managed Refuge lands. The closure, which remained in place after the Service resumed management, runs from January through August on all the Refuge and until September on the south part of the Refuge.

The program presents several concerns with regard to the Refuge purpose and goals. Foremost among these is the possible disturbance to wildlife, especially from helicopters, simulated explosives, and all-terrain vehicles. Other concerns include habitat impacts at camps, the disturbance to other visitors, and the loss of public hunting opportunity due to a closure enacted for troop safety. If the Air Force's use of the Refuge is discontinued, the program would likely be moved to another area. In the meantime, there could be disruption of activities that contribute to the national defense.

Issue Summary: Should the Air Force be allowed to continue utilizing the Refuge as a training grounds? If so, what guidelines are appropriate to ensure compatibility with the Refuge purpose and goals?

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Issue 5. Role of Little Pend Oreille NWR in the Regional Economy

In July, 1998, the Refuge held a public open house in Colville to present preliminary alternatives to the public. At that meeting, local community members expressed concern about how refuge management changes would affect the economy. Refuge programs currently create some economic benefit, directly as expenditures and/or payments, and indirectly as support to local industries (for example the recreation and livestock industries). Till now, no analysis had been available to estimate the economic benefit that the Refuge currently provides, and there was only a vague idea of how management proposals under any of the alternatives would change the economic outputs and benefits to local industries. Average per capita income in Stevens County is nearly the lowest of all counties in the state. The community members requested that a more detailed economic analysis be completed before adoption of the Comprehensive Conservation Plan.

Issue Summary: What is the current economic benefit provided by the Refuge and what would be the economic effect of programmatic changes under the CCP?

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Chapter 2: Affected Environment

2.1 PHYSICAL ENVIRONMENT

Geographic and Topographic Setting

Little Pend Oreille NWR is located in northeastern Washington, about 70 miles north of Spokane, the state's second largest city. Colville, the Steven's County seat, is about 10 miles northwest, while the town of Chewelah is about 15 miles south.

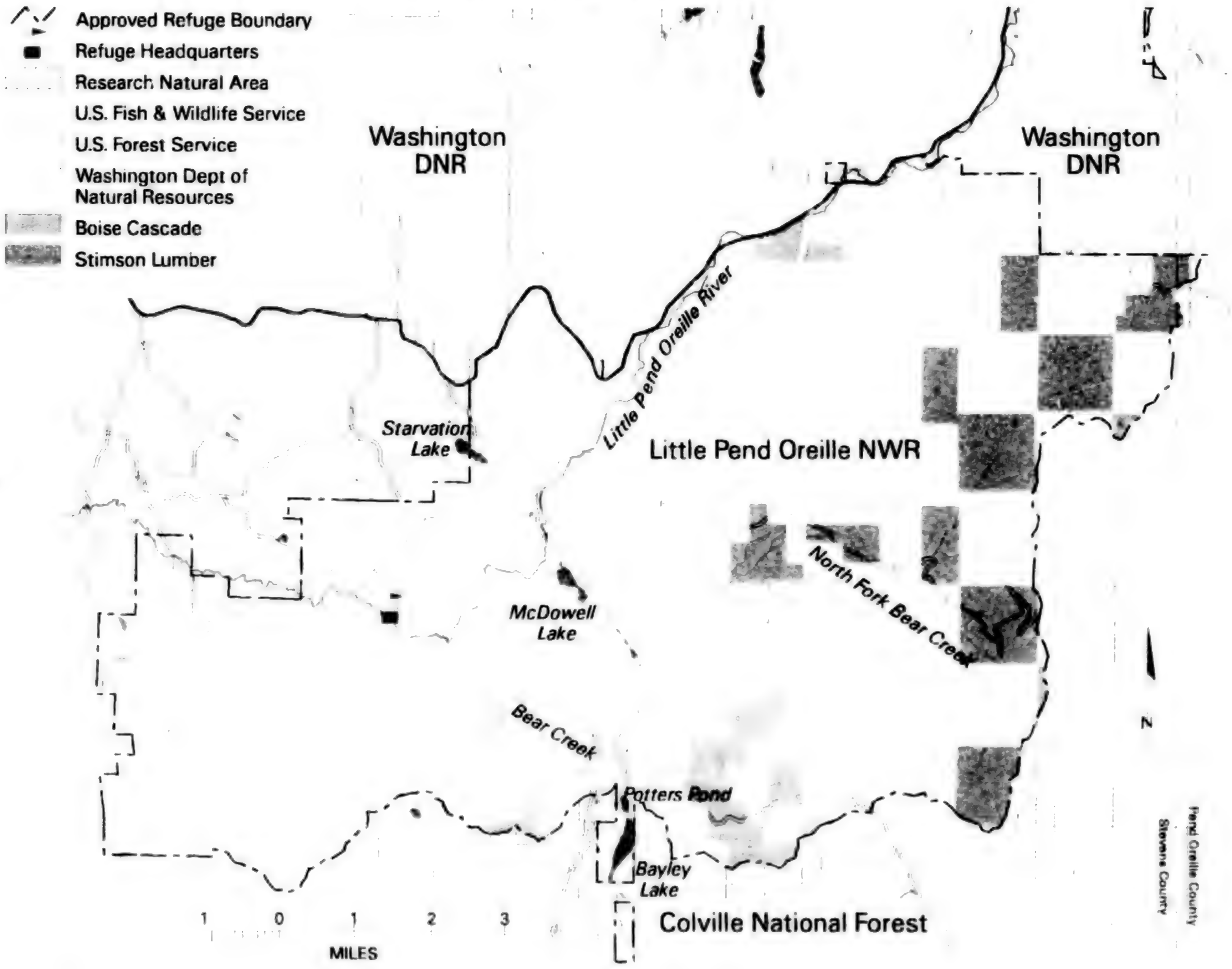
The Refuge lies within the Okanogan Highlands Physiographic Province (Franklin and Dyrness 1973) of northeastern Washington, and is within the Columbia River Basin Ecosystem (which includes those lands inside the United States east of the Cascade Crest in Washington and Oregon). The Okanogan Highlands Province extends from the Okanogan River to the Idaho border.

The Refuge landscape was shaped by events occurring during the Pleistocene epoch (2 million -11,000 years) when continental ice sheets from Canada excavated and molded valleys and glaciers scoured lakes and shaped mountains. The Refuge lies on the western edge of the Selkirk Mountains, whose topography influences the climate and plant communities of the area. Refuge elevations range from 1,800' on the west to 5,600' at Olson Peak on the eastern boundary. Most of the Refuge is underlain by sandy loam soils which are derived from deep glacial drift. Westerly winds prevail, bringing warm air from the Pacific Ocean which moderates year-round temperatures. Some weather patterns are influenced by inland continental air masses from the south and north. The Refuge receives between 15-25" of precipitation per year in the valleys with up to 40" at higher altitudes. Temperatures range from the upper 40s ° Fahrenheit to middle 80s in summer and between 10 and 32 ° F in winter.

Regional Land Setting, Land Use Trends

Within the 1939 Executive Order (E.O. 8104) boundaries of the Refuge are approximately 10,000 acres of "inholdings." Most of the inholding parcels surrounded by Refuge lands are owned by Stimson Lumber Company (6500 acres) or Boise Cascade (1500 acres), both commercial timber companies. Map 3 shows Refuge features and surrounding land ownership. The Refuge surrounds two other privately owned tracts, totaling 120 acres. The City of Colville owns approximately 250 acres within the north-central Executive Order boundaries. Most of the other inholdings border the Executive Order boundary and are owned by diverse owners, most with less than 200 acres.

Map 3. Refuge Features and Surrounding Ownership



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Within the Refuge boundaries, most of the commercially-owned timber lands were clear cut within the last 20 years, before the Washington State Forest Practices Act of 1988. Large blocks of land, sometimes whole sections (640 acres), were clear cut. Timber prices have been at record high levels in the recent past, encouraging many adjacent private landowners to log their property.

On the southern and eastern boundaries, the land is primarily managed or owned by the Colville and Kaniksu National Forests, and Boise Cascade and Stimson Lumber Company. The Washington Department of Natural Resources manages two large blocks of land north of the Refuge, the Narcisse and Little Pend Oreille blocks. They manage these State-owned lands primarily for the long-term economic benefit of the local schools (i.e.,revenue from timber production and livestock forage). Secondarily, when not in conflict with this primary purpose, state lands may be managed for watershed, wildlife habitat, open space, and recreation. Washington Department of Natural Resources manages two public campgrounds on the northern edge of the Refuge - Starvation Lake and Flodelle Creek campgrounds, and oversees a recreational trail system used primarily by off-road vehicles. More than 75 miles of recreational trails located east of the Refuge were jointly planned by Washington Department of Natural Resources and the National Forest. The area northeast of the Refuge is also part of a lynx management unit.

National forest lands are managed for multiple resources and uses including recreation, wildlife and fish, range, timber, watershed, forage, minerals, and wilderness. In 1996, the Colville National Forest Supervisor decided to implement the Addy-Chewelah Project, which includes harvest of 54 million board feet of timber on 13,550 acres within the 47,158 acre area which is bordered by the Refuge on the north. This action also involves construction of approximately 62 miles of new roads, 2,590 acres of noncommercial thinning, and 8,842 acres of prescribed fire. Most of the Forest Service land bordering the Refuge on the east and south is managed for timber and forage production objectives, with fewer bordering acres managed for scenic values, winter range, recreation, and old growth.

Regardless of ownership, there is an increasing trend in road development, forest fragmentation loss of older-aged forests, recreational use, riparian habitat degradation, and rural residential development on lands surrounding the Refuge. Growth within Stevens County is affecting privately owned land near the western and northern Refuge boundaries. Within the last three years, new homes and subdivisions next to the Refuge boundary, have been added near five Refuge access points (Narcisse Creek Road, Buffalo Wilson Road, Miller Road, Bear Creek Road, and Slide Creek Road). New short and long plat developments have also been planned along Highway 20 on the northern Refuge border. Rural residential development increases the potential for habitat fragmentation, wildlife people conflicts, pest management problems, risks of prescribed fire, and need for law enforcement. Development close to Refuge lands may increase market pressure on smaller private landowners to sell their lands for more development. Real estate market values are usually higher for property adjacent to public land

Air and Water Quality

The Refuge and surrounding lands currently meet federal air quality standards for the six "criteria pollutants": particulates; nitrogen oxides; sulfur dioxides; lead; ozone; and carbon monoxide. The closest non-attainment area is located in and around the city of Spokane. The only Class I area (areas where air quality standards are stricter because of outstanding visual resources) in eastern Washington State is in the wilderness area of the Okanagan National Forest. Hundreds of other airborne chemicals may be toxic or hazardous, but are not subject to ambient standards under state or federal law.

Current and potential air quality concerns at the Refuge revolve primarily around wood smoke generated from prescribed fire. Wood smoke contains particulates and pollutants that have been demonstrated to be hazards to human health, including over 130 known carcinogenic substances such as formaldehyde, methane, carbon monoxide, and benzene. These particulates and pollutants may be hazardous to local residents, especially those individuals with existing breathing problems, and to firefighters, who may endure extreme exposure for weeks at a time. The potential for air pollution problems is exacerbated by the extreme levels of fuel loading that have accumulated in forests of the northwest from 60 years of fire exclusion policies.

Water quality is measured by various factors including turbidity, fecal coliform counts, and temperature, as well as physical parameters such as peak flows and channel characteristics. Water quality strategies are determined in part by the "designated uses" for main rivers. The waters of the Little Pend Oreille NWR largely flow into the Colville River, which has designated uses of aquatic life, fish consumption, and primary contact recreation-swimming (EPA web site). Much of the Colville River is considered water quality impaired by the Environmental Protection Agency (Quigley and Arbelbide, 1997).

Special Status Lands

Research Natural Areas

Two Research Natural Areas (RNAs) have been established within the Refuge. These areas protect natural features and preserve natural processes for scientific purposes; the guiding principle is to prevent unnatural encroachments and activities which directly or indirectly modify ecological processes.

> **Baird Basin RNA** was established in 1959, and exemplifies typical northeastern Washington ponderosa pine, Douglas-fir, and grand fir forest stands along ridge tops and north and south slopes. The 160 acre RNA is located in the northwest portion of section 10, T. 34 N., R. 41 E., Willamette meridian, at 48° 30' N. latitude, 117° 40' W. longitude.

Varline Grove/Flodelle Creek RNA includes 80 acres of mature larch and Douglas-fir, Engelmann spruce, subalpine fir, and lodgepole pine located in the northwestern part of SE SW 1/4 section 7, T35N, R42E, 48 32' N latitude, 117 34 W longitude

Wilderness Suitability

The Wilderness Act of 1964 stimulated a great deal of interest in the possibility of designating a portion of the Refuge under this initiative. In the early 1970s, a study was undertaken to determine the suitability for the Refuge as wilderness. After lengthy research, public hearings, letter campaigns, and much discussion, it was determined that the Refuge did not fit the designation and was rejected in 1974. It was rejected because the State issued permits for haying, grazing, timber sales, and other uses. Also, there were plans to cut trees in the roadless areas. Subsequent cutting and road building did take place in portions of the 1974 roadless area. Despite this lack of technical classification, there remains a 5,520 acre block of unroaded and largely undisturbed forest in the southeastern corner of the Refuge. This area requires special consideration in future step-down management plans.

Other Refuge Management Parcels

The Little Pend Oreille NWR administers two disjunct properties outside the administrative boundary of the Refuge. Both parcels became federal property when the previous owners defaulted on Farmer's Home Administration loans. Because both parcels contained valuable wildlife habitats, management of these lands was transferred to the U.S. Fish and Wildlife Service and are administered by the Refuge.

The first parcel is the 54.7 acre Norris Tract located about 1 mile west of Springdale, Washington. The majority of this parcel is a shallow water wooded wetland composed of emergent wetland plants including sedges, cattails, rushes and, canary grass, as well as shrubs such as red osier dogwood alder, water birch, and willows. The remainder of the tract was cleared and farmed. This area forms the headwater of Swamp Creek, which flows south from the parcel. It is also ditched so as too partially drain northward into nearby Sheep Creek. The parcel is fenced to exclude livestock. Wildlife observed here include white-tailed deer, song sparrow, snipe, and several species of waterfowl.

The 298 acre Cusick tract is located within the 100 year flood plain of the Pend Oreille River about 3 miles north of Cusick, Washington. About 75% of the property was formerly farmed for timothy hay production. The remaining property is forested with aspen, lodgepole pine, dogwood, hawthorn, water birch and other shrubs. In addition to timothy grass, other herbaceous species growing on the property include Oregon grape, yarrow, reed canary grass, hawkweed and knapweed. The trees are currently unmerchantable. There are several small wetlands on the property. Fingers of Trimble Creek which extend onto the parcel a short distance and contain water year around in most years. The south half of the parcel's lower elevation and clay soils allow it to hold water briefly after rains and during spring runoff. However, this area has been ditched in the past to promote drainage. The northeast and east portions of the property are bounded by county maintained dikes designed to keep the Pend Oreille River out of the flood prone Cusick Flats area. The parcel is fenced to exclude livestock. Wildlife commonly observed on the area includes several species of ducks, Canada geese, snipe, savannah sparrow, meadowlark, white-tailed deer and coyote.

2.2 REFUGE HABITATS

The purpose of this section is to broadly describe the existing environment and known or suspected trends.

This information will be used to:

- Show specific changes from historical to current times within the planning area.
- Establish a starting point for data collection that will be a major part of operational responsibilities for Refuge staff after the plan is complete, and
- Lay the foundation for understanding and evaluating the alternatives discussed later in this document.

Landscape Perspective

Background

Forests and streams similar in composition and condition to those found at the Refuge extend over vast areas of eastern Washington, eastern Oregon, western Montana, and Idaho. In order to understand the role of Refuge lands within the ecosystems of this region, it is helpful to consider some natural resources and processes within a larger landscape context. The Little Pend Oreille National Wildlife Refuge is not an island. Its waters drain into the Colville River, which ultimately flows into the Columbia River. Its borders connect to other public forested lands managed by the U.S. Forest Service and the Washington State Department of Natural Resources, as well as to forested lands owned privately. The habitats on Refuge owned lands continue to be influenced by processes which operate at a larger scale, such as fire, species migrations, and climate. In addition, most species found on the Refuge range over much larger portions of the Western states. It is a biological principle that the maintenance of viable populations (especially of larger, wide ranging animals) is positively correlated with the degree to which habitat areas are large and well connected. A realistic assessment of Refuge resources incorporates an analysis of the condition of the surrounding habitat. This is the function of this portion of the CCP/EIS. With this knowledge in hand, the Refuge can better understand the kind of contribution it can and should make to the larger ecosystem.

The concept of managing for the "Historic Range of Natural Variability" (HRV) has gained increasing acceptance from resource scientists over the last decade. Essentially, the idea is based in the observation that conditions existing in America at the time of European settlement are now dramatically altered and that this alteration has had significant repercussions for species habitats and ecosystem health. The concept recognizes that, before European settlement, while any one part of the landscape was continually undergoing a process of dynamic change, overall the landscape and its processes could be characterized as falling within a certain set of natural ranges that generally were consistent over time within larger areas. The concept of HRV does have some detractors, who feel that the model does not adequately encompass dramatic continental changes such as the glacial period, or that the influence of native Americans is not taken sufficiently into consideration. Moreover, there is little likelihood that American society would gladly embrace the set of social changes that a true return to the HRV across a regional landscape would require. However, numerous scientists and managers feel that applying this concept on publicly owned lands with a mission of species conservation is wholly appropriate and probably the best way to manage for the suite of species that inhabit these lands over the long term.

Analysis

Taking the Interior Columbia basin (the portion of the western states draining into the Columbia River east of the Cascade range) as a whole, it is known that significant changes have taken place in forest ecosystems (Quigley and Haynes, 1996, USDA and USDI, 1997). The scientists who authored the summary reports and Environmental Impact Statements for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) found several key changes in forest ecosystems, including:

- Interior ponderosa pine has decreased across its range with significant decreases in old, single-story structure. The primary transitions were to interior Douglas-fir and grand fir/white fir.

- There has been a loss of the large tree component (live and dead) within roaded and harvested areas. This decrease affects terrestrial wildlife species that are closely associated with these old forest structures.

- Generally, mid-seral forest structures have increased in dry and moist forest groups, with a loss of large scattered and residual shade-intolerant trees and an increase in the density of smaller shade-tolerant trees.

- There has been an increase in fragmentation and a loss of connectivity within and between blocks of late-seral stage, old forests, especially in lower elevation areas and riparian areas. This has isolated some animal habitats and populations and reduced the ability of populations to move across the landscape, resulting in a long-term loss of genetic interchange.

- There has been an increase in access for humans which has decreased the availability of areas with low human activities.

It's instructive to look at yet another scale, the scale of the sub-basin, to see if the trends identified for the Interior Columbia basin hold true in the more immediate vicinity of the refuge. This sort of analysis is consistent with the "watershed analysis" approach that has been widely used in the Northwest for the last seven-eight years. For the purposes of this analysis, the Colville sub-basin, an area measuring some 650,000 acres, was chosen as the scale at which to assess the surrounding ecosystem.

The Refuge is a 40,000 acre parcel of land which lies within the Colville sub-basin. An analysis of vegetation structures throughout the Colville sub-basin shows they generally follow the trend identified above for the entire interior basin. Vegetation structures within this sub-basin have been significantly altered since the late 1800s. Table 2-1 compares the current extent of different vegetation structural stages with their historic extents (circa 1900), within the Colville sub-basin. The analysis is based on current and historic vegetation data compiled for the ICBEMP effort and publicly available with the spatial data sets on their web site (www.icbemp.gov). Vegetation data was generalized to the square kilometer. Structural stages are defined within the Glossary (Appendix A).

Table 2-1 shows that although forest cover types continue to be found over approximately the same total areas as in 1900, dramatic changes in forest structure have occurred over large areas of the watershed (See Map 4). Specifically, old single-strata forest is gone from the watershed completely and old multi-strata forest covers only about 10% of its former area in the watershed. And young forests, particularly the mid seral types of young multi-strata forest and understory reinitiation forest cover about 15-18 times their extent in 1900. These changes are displayed on Map 4.

These changes in forest structure on a sub-basin scale have significant repercussions for wildlife habitat, especially for those species with narrower habitat requirements. At the scale of the entire Interior Columbia Basin, at least eight terrestrial vertebrate species have experienced a loss of greater than 67% of the habitat available to them historically, while an additional 47 terrestrial species have experienced a loss of 33-67% of their historical habitat (Wisdom, et. al, 1998). These species include the white-headed woodpecker, the flammulated owl, Western bluebird, hoary bat, and many others.

Table 2-1. Changes in Vegetative Structure within the Colville Watershed, circa 1900- present

VEGETATION STAND STRUCTURE	Seral Stage	Approx. Current Acres (1991)	Current Percent of Water-shed (1991)	Approx. Historic Acres (~1900)	Historic Percent of Water-shed (~1900)	Absolute Percent Change in Landscape (Current % minus historic %)	Approximate Ratio of Current Extent Coverage to Historic Extent Landscape (Current acres divided by historic acres)
Forest Habitat Types							
Stand Initiation Forest	early	24341	4%	68817	11%	**-7%**	1:3
Stem Exclusion Closed Canopy Forest	mid	126158	20%	170011	26%	**-6%**	3:4
Stem Exclusion Open Canopy Forest	mid	40447	6%	19672	3%	**3%**	2:1
Young Multi-strata Forest	mid	99104	15%	3459	1%	**14%**	29:1
Understory Reinitiation Forest	mid	239454	37%	11003	2%	**35%**	22:1
Old Single-strata Forest	late	0	0%	138643	21%	**-21%**	1:139,000
Old Multi-strata Forest	late	15283	2%	135868	21%	**-19%**	1:9
Old Multi-strata Woodland		94	0%	0	0%	**0%**	94:1
Subtotal: Forest Habitat Types			84%		85%	**-1%**	1:1
Non - Forested Habitat Types							
Closed Herbland		37410	6%	13752	2%	**4%**	3:1
Open Herbland		247	0%	0	0%	**0%**	247:1
Agricultural		47947	7%	0	0%	**7%**	48,000:1
Open Low Shrub		12560	2%	17050	3%	**-1%**	3:4
Closed Mid Shrub		494	0%	66256	10%	**-10%**	1:100
Water		1483	0%	1483	0%	**0%**	1:1
Urban		988	0%	0	0%	**0%**	1000:1
Subtotal: Non-Forested Habitat Types			15%		15%	**0%**	0
Total Area		**646011**	**100%**	**646011**	**100**		

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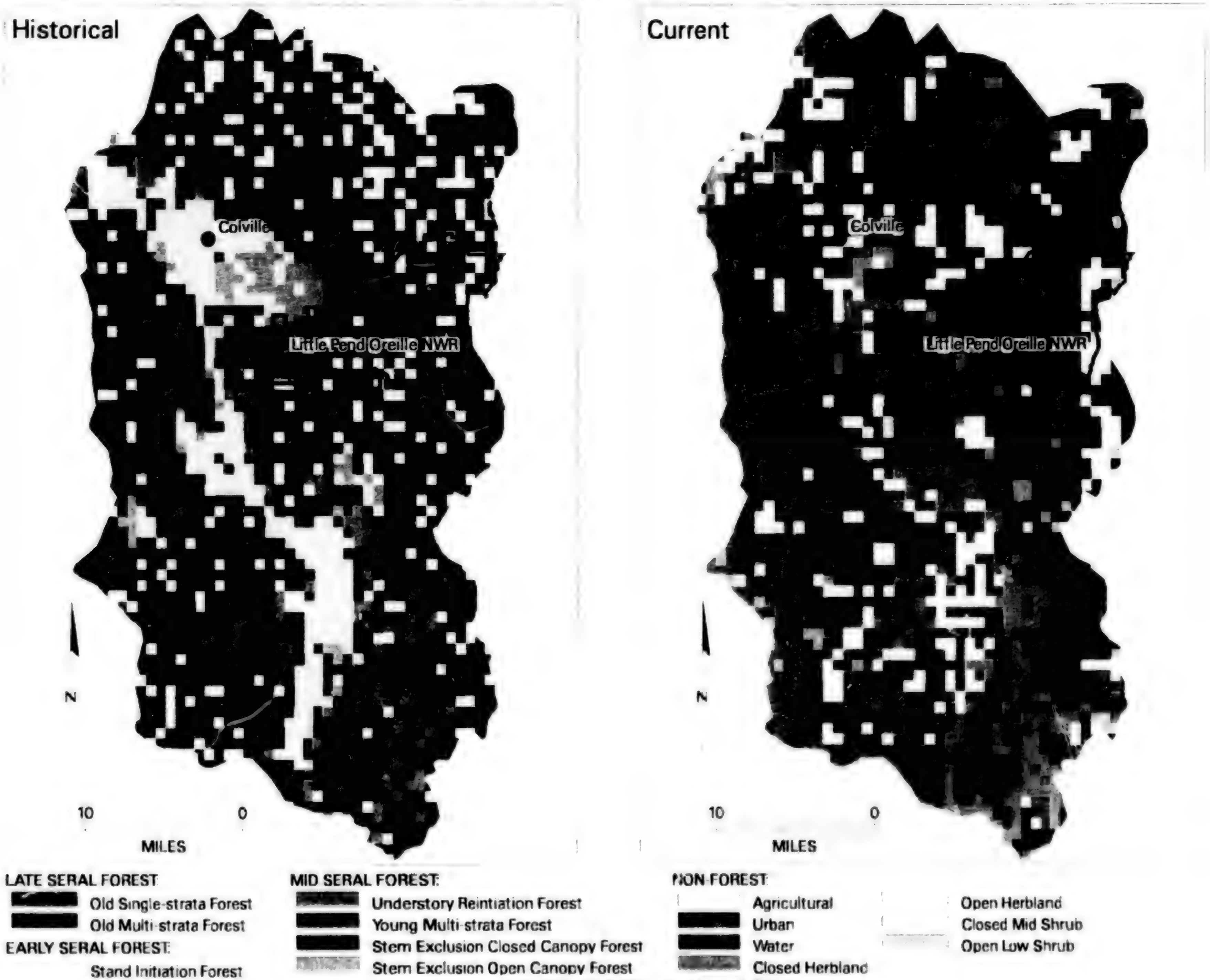
Map 4. Historic and Current Vegetation Structural Stages in the Colville Sub-basin



Ron Bartel, 16 April 1999, f:\ipo1\ \colvveg.e

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Two key processes that have contributed to the change in forest structure on this scale are logging, which until recently focused primarily on removal of high-value large diameter trees, and fire suppression. Table 2-2 demonstrates the modification of fire regimes throughout the Colville watershed for the same time period.

Table 2-2. Changes in Fire Regimes throughout the Colville watershed, circa 1900 - present

FIRE REGIME	Current Acres (1991)	Current Percent	Historic Acres (~1900)	Historic Percent	Absolute Change	Approximate Ratio of Current to Historic
Lethal / frequent	6905	1%	83512	13%	-12%	1:13
Lethal / infrequent	299256	46%	2224	0%	46%	134:1
Lethal / very infrequent	99172	15%	29322	5%	11%	3:1
Mixed / frequent	247	0%	202524	31%	-31%	1:82
Mixed / infrequent	71559	11%	1218	0%	11%	59:1
Non-lethal / very frequent	0	0%	253653	39%	-39%	1:254,000
Non-lethal / frequent	0	0%	36346	6%	-6%	1:36,000
Non-lethal / infrequent	166417	26%	35791	6%	20%	5:1
Rarely / n.a.	2455	0%	1423	0%	0%	2:1
Total	646011	100%	646011	100%		

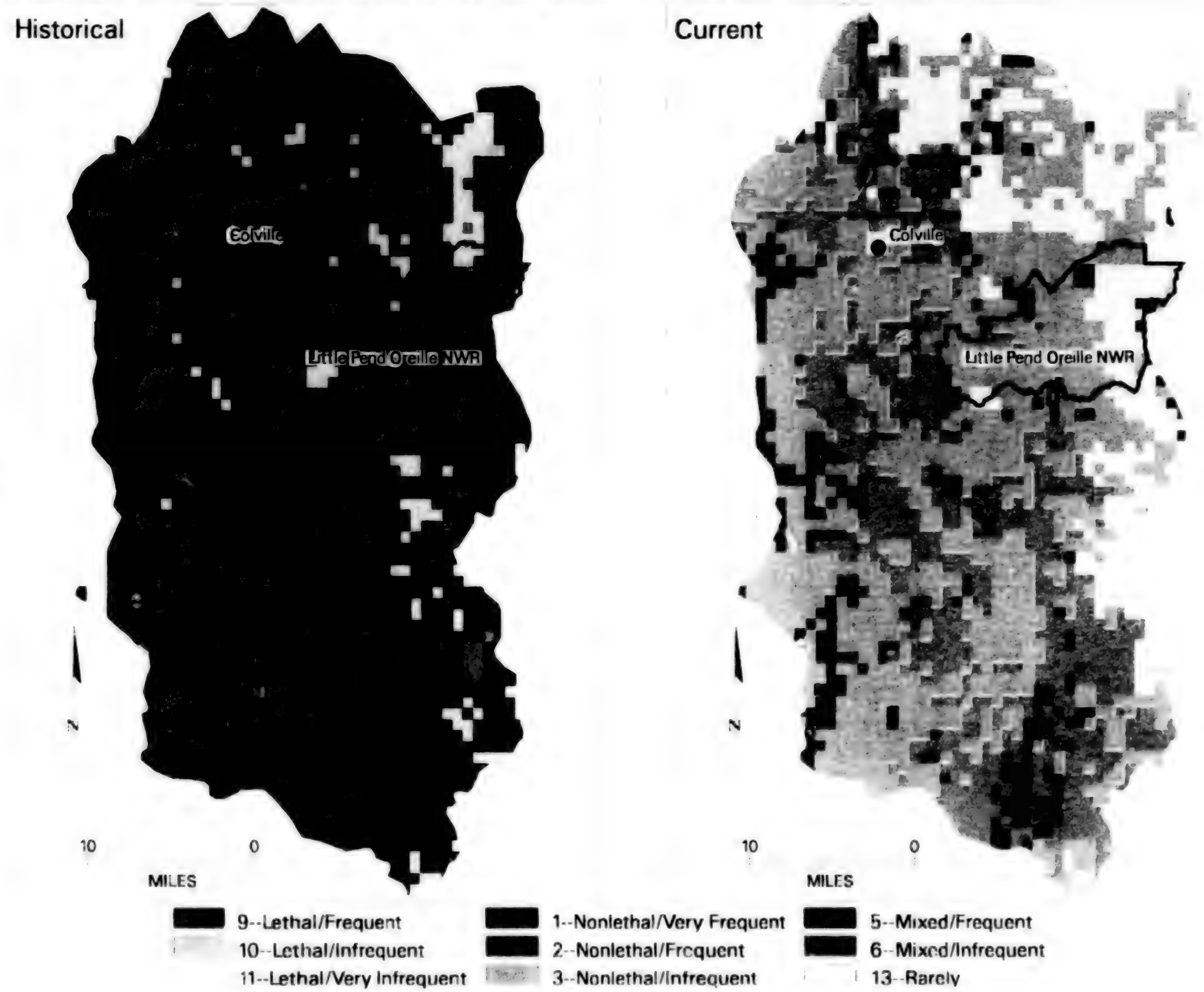
Map 5 and Table 2-2 demonstrate that there has been a clear shift in fire regimes throughout the watershed from frequent to infrequent fires. In general, fires regimes have also become more lethal. Specifically, non-lethal, frequent and very frequent fires and mixed, frequent fires have declined, with a corresponding dramatic rise in lethal and infrequent fires. The frequent, non-lethal fires of the past contributed to the maintenance of large trees and open understories typical of a vegetative habitat structures such as single strata ponderosa pine. The loss of frequent and non-lethal fires have led to ever-increasing fuel loads, crowded and over-stocked forest stands and a greater and greater risk of catastrophic (lethal) fire occurrence.

The ICBEMP Science Integration Team looked at the variety of processes and conditions occurring across the landscape and resolved to integrate these into an overall measure, called "ecological integrity". Ecological integrity was defined as encompassing: a) the maintenance of evolutionary and ecological processes; b) the maintenance of functions and processes dependent of multiple ecological domains and evolutionary time frames; and c) the maintenance of viable populations of native and desired non-native species.

Overall, the Colville sub-basin was characterized as being of low forest, aquatic, hydrologic, and composite ecological integrity (Quigley, et.al, 1996). The scientists identified the following primary opportunities to address these risks to integrity:

- Restoration of forest structures

Map 5. Historic and Current Fire Regimes within the Colville Sub-basin



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- Maintenance of scattered aquatic strongholds that exist
- Reduction of the risk of fire, insect and disease.

In the early part of this century, the immediate area of the Refuge surrounding the lower and middle portions of the Little Pend Oreille River was occupied by homesteaders and lumber camps. Decades of farming, grazing, mining, and logging reduced the quality of the habitat to such a degree that the Little Pend Oreille white-tail deer herd was believed to be in jeopardy. As farms and ranches went "bust" and the best accessible timber was decimated, private ownership of the land was abandoned. Land reverted to Federal ownership through a variety of Acts and Statutes with the end result being the issuance of Executive Order No. 8104 signed by President Franklin D. Roosevelt on May 1, 1939, which established the Little Pend Oreille Wildlife Refuge. On July 27, 1940, this became the Little Pend Oreille National Wildlife Refuge by Proclamation No. 2416. Today, the Refuge comprises 40,198 acres most of which is timbered and typical of the surrounding forests.

Early management consisted of various projects designed to enhance the deer population, fishing opportunities, and waterfowl habitat. Primary management focused on the white-tailed deer herd and their winter range but some activities also centered on forest grouse habitat and the fishing opportunities afforded by the areas lakes and streams.

The Refuge's forests can be grouped into the three broad potential vegetative groups described in the Eastside Assessment (USDA 1997): dry, moist and cold forests. Each vegetative group consists of several potential vegetation types. For example, those potential vegetative types making up the Dry Forest potential vegetative group that occur on the Refuge are: dry Douglas-fir with ponderosa pine, dry Douglas-fir without ponderosa pine, and interior ponderosa pine. While these broad potential vegetative groups do not always completely describe the forestland vegetation found on the Refuge, these potential vegetation groups are useful in categorizing the forest types found on the Refuge. Some animals are associated with only certain forest groups. For example, wintering deer use the dry and moist forest types, while the Canada lynx lives primarily in the cold forest types.

Table 2-3. Acres and Percentage of Habitat by Forest Type on the Little Pend Oreille NWR

HABITAT ZONE DESCRIPTION	ACRES	PERCENT
MOIST FOREST	36094.39	73.24
DRY FOREST-PONDEROSA	4947.44	10.04
DRY FOREST-SSW FIR	4409.40	8.95
COLD FOREST	3829.06	7.77

The distribution of forest types key wildlife habitats is displayed in Map 6.

Map 6. Distribution of Forest Types and Selected Wildlife Habitats

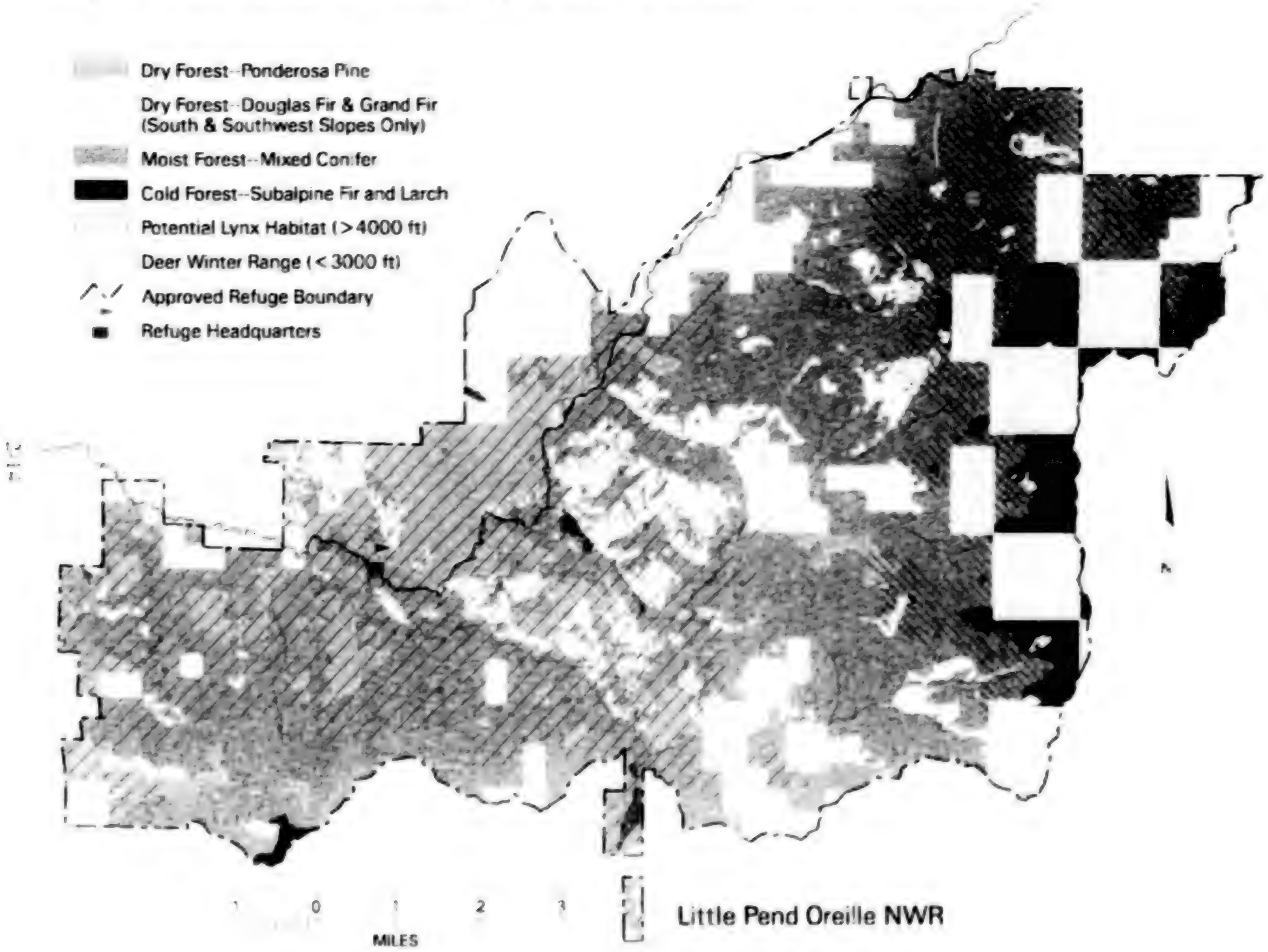
Dry Forest--Ponderosa Pine
Dry Forest--Douglas Fir & Grand Fir (South & Southwest Slopes Only)
Moist Forest--Mixed Conifer
Cold Forest--Subalpine Fir and Larch
Potential Lynx Habitat (>4000 ft)
Deer Winter Range (<3000 ft)
Approved Refuge Boundary
Refuge Headquarters
1 0 1 2 3
MILES
Little Pend Oreille NWR

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Figure 2-1 shows a graphical cross-section of Refuge forest types. Specific forest groups are discussed below.

Dry Forest Vegetation Group

The dry forests, dominated by ponderosa pine and dry Douglas-fir growing on south or southwest facing slopes, covers about 7,943 acres or 20% of the Refuge. These species can survive the harsh, dry conditions and the frequent fire disturbance typical of low elevation, and areas. This zone is characterized by frequent (5-50 years), low intensity fire (Agee 1993). Deciduous trees and shrubs are primarily limited to under-story plants and riparian species. A typical or "natural" dry forest landscape would be dominated by ponderosa pine stands. These stands would be of mixed age, but individual stands would generally be uniform, with single-aged, widely-spaced trees. Grasses or woody shrubs would dominate the under-story, depending on the recent fire history. These stands can be quite long-lived and productive, once established, but tend to regenerate slowly because of the short fire interval and dry conditions. Where factors such as aspect, slope, soils and moisture allow, dry sites can be dominated by Douglas-fir and grand fir. These species are more susceptible to fire until they become large and mature.

This description illustrates the importance of fire disturbance to this forest system. However, human activities have affected both the disturbance cycle and the process of succession in these dry sites. Patterns of plant species succession have been altered by harvesting selected, mature trees, allowing cattle grazing on the grasses and shrubs, and suppressing fire. As a result, there are more dense stands, less woody shrubs, and a gradual increase in shade-tolerant species such as Douglas-fir and grand fir. The "clumpy" nature of single story, mature stands that was prevalent in the past is not as obvious now. These structural changes affect how well the area supports wildlife. For example, available winter forage or "browse" for deer may limit the size of the population. There are likely other effects on small mammals and forest birds that have not been explained.

The effects of past forest management, particularly fire exclusion, is a major issue discussed in the Eastside Assessment. In some cases, fire may be less frequent now than it was historically, but the chance of a lethal or complete stand-replacement fire may be much greater (See Table 2-2). Also, as mentioned above, there is a regional trend towards reduced range of shade-intolerant species, such as ponderosa pine and encroachment by tolerant species such as grand fir. This trend is also evident in Refuge forest stands and sub-basins.

Moist Forest Vegetation Group

The moist forests of the Refuge are dominated by Douglas-fir, grand fir, western red cedar, and western hemlock. Other tree species include lodgepole pine, western white pine, western larch, and Englemann spruce. The composition and structure within this vegetation group can vary greatly, making it hard to summarize. At lower elevations, near the Dry Forest transition, the forests may be dominated by Douglas-fir. Cedar and hemlock would be mostly limited to cooler, wetter sites, such as riparian zones, or micro-sites strongly influenced by northern aspect and flatter slopes. This forest group dominates the area with its estimated 19,687 acres comprising about 75% of the Refuge's forest cover.

Low intensity, non-lethal ground fires occur on the averaged every 15 to 26 years. High intensity crown fires, which are commonly stand-replacement or lethal fires, may have occurred every 20 to 150 years. Fires, where some areas burn very hot with severe effects and others burn cooler with little effect, may have occurred every 20 to 300 years. Variations in moisture, climate, soil productivity, and number of tree species, combined with a complex fire regime, result in a diverse range of vegetative conditions. The successional pathway of any given site is therefore difficult to predict. From a landscape perspective, a healthy, moist forest can be generally described as primarily closed canopy, with a diversity of trees, herbs, and shrubs. The complex fire regime would result in a variety of stand structures, including old growth single layer canopies and multi-storied stands. A great degree of other structural features, such as large snags and downed woody debris, would be prevalent.

Because of its longer fire interval, the effects of fire suppression and exclusion are not as obvious in the moist forest zones of the Refuge as in the dry forest zone. However, overstocking and conversion to more shade tolerant species is evident. Consequently, the risk of lethal fire at the Little Pend Oreille is presently greater than in the past. Logging in moist forest habitats has also had a lasting effect similar to that in the dry forest areas. A high degree of fragmentation is evident from aerial photos, which show the effects of clear cuts in Refuge inholdings and associated management roads.

In general, the rich habitat diversity found in this zone supports a wide range of wildlife species. More information is needed to document wildlife use and the effects of past management.

Cold Forest Vegetation Group

The cold forest zone defines the upper elevational limit for tree survival. Rates of tree growth are generally slow in comparison to the lower elevation moist forest. Nutrients are generally limited, and the maintenance of downed and dead wood is important to these sites. Disturbance from fire is variable, ranging in intervals from 100 to 300 years, and the intensity and extent of fires is highly dependent upon the landform, topography, fuel type, and weather conditions. Because of the extreme conditions at high elevations, blowdowns are also an important natural disturbance process (DeLong 1996).

At the Little Pend Oreille, the cold forest zone has been nominally set at greater than 4500'. This habitat zone comprises only about 5% (2,095 acres) of the forest habitat found on the Refuge, occurring primarily on the extreme southern and eastern borders of the Refuge. Like the moist forest zone, the effects of fire suppression are evident, but not as marked as in dry sites. In the absence of disturbance, these forests are dominated by subalpine fir and Engelmann spruce. Other species that are relatively common in seral communities are western larch, Douglas-fir, western hemlock, lodgepole pine, western white pine, and grand fir.

Except for inholdings and scattered homestead activities, most high elevation areas on the Refuge are relatively undisturbed. Some areas have been roaded, grazed, and selectively logged but not to the degree found in the other forest zones.

Quaking aspen occurs in the more hydric sites across all three of the forest vegetation groups. Many aspen stands on the Refuge tend to be mature and even-aged, with regeneration conspicuously retarded or absent. Vegetative reproduction via suckering is the primary way these stands are enlarged and perpetuated. For vigorous sucker reproduction to occur, strong light and heat must reach the forest floor; shading from competing conifers reduces this needed sunlight. This may be a significant factor on the Refuge, especially in the dry forest zone where fire suppression has allowed conifers to encroach into sites previously dominated by the more fire-adapted aspen. In addition to fire suppression, annual browsing of aspen suckers by wildlife and domestic livestock suppresses the parent tree's efforts to clone, ultimately resulting in the development of decadent, non-sustaining stands.

Riparian Habitats

Named for the Little Pend Oreille River which flows through its northern expanse, the Refuge contains the entire Bear Creek sub-watershed, as well as most of the Cedar Creek and Olson Creek sub-watersheds within its boundaries. Most of the southern and eastern Refuge boundaries are formed by the watershed divide. All Refuge tributaries flow into the Little Pend Oreille River and hence into the Colville River, except Slide Creek and Moran Creek which flow directly into the Colville River. The Colville River ultimately flows into the Columbia River near Kettle Falls. Riparian areas are lands adjacent to perennial or intermittent bodies of water such as streams, springs, or lakes where vegetation is strongly influenced by the presence of water. Riparian areas also are usually the transition zone between aquatic and upland sites.

Riparian areas are the Refuge's most dynamic areas from an ecological perspective, but create many challenges for land managers. Riparian zones are of great interest due to their intrinsic value as wildlife habitat. Because much of the western U.S. is arid, riparian zones provide the moisture and nutrients to support a greater variety of vegetation than upland areas, in turn supporting a greater diversity of wildlife. The riparian areas, especially in the dry forest vegetation zone, provide some of the Refuge's most species-rich habitats. For example, many migratory bird species use riparian zones exclusively for nesting and foraging. From a regional standpoint, the Eastside Assessment found that 64 out of 132 breeding migrant bird species were dependent upon riparian areas for nesting and foraging. Riparian areas are also disproportionately important for a number of other wildlife species, including frogs, snakes, bats, voles, grouse, and deer.

Aquatic Habitats, including Rivers, Streams, Wetlands, Lakes, and Ponds

Wetlands and deepwater habitats on the Refuge include artificial lakes, natural wetlands, ponds, springs, and both perennial and intermittent streams. Map 7 displays Refuge aquatic habitat.

Wetlands are defined as areas soaked by surface or groundwater frequently enough to support vegetation that requires saturated soil conditions for growth and reproduction. Deepwater habitats are defined as permanently water covered lands where the water is often deep, such as streams and lakes.

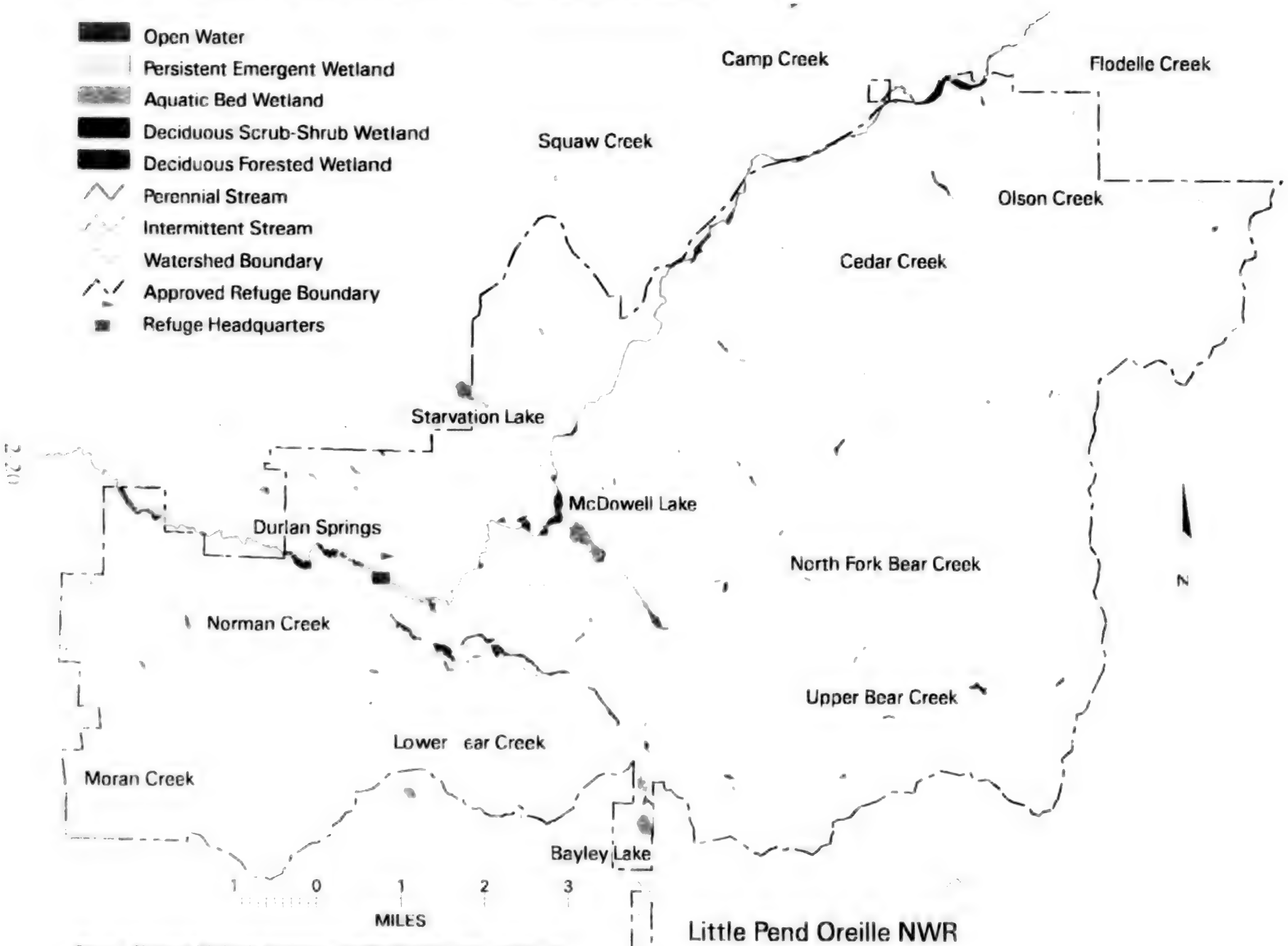
Occurrence and classification of wetlands and deep water habitats, including ponds, marshes, streams and lakes, on the Little Pend Oreille NWR was determined using the U.S. Department of Interior, Fish and Wildlife Service National Wetlands Inventory maps. These documents were prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands and deepwater habitats were identified in the photographs based on vegetation, visible hydrology, and geography using a system described in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). This analysis was accomplished using aerial photos taken in August 1983, and reflect the conditions during that specific year and season. An inherent margin of error always exists with the use of aerial photographs. Additionally, small wetlands and those obscured by dense forest cover may not have been identified on these maps.

Wetlands and deepwater habitats occurring on the Refuge fall into 3 broad system definitions: palustrine (ponds, marshes, bogs, swamps and fens), lacustrine (both deep and shallow lakes), and riverine (rivers, streams, and creeks).

Palustrine Systems

One hundred ninety five palustrine wetlands were identified on the Little Pend Oreille Refuge by the National Wetlands Inventory. Wetlands occurring on private lands within the administrative boundary of the Refuge were not included. Palustrine wetlands were classified by either their water regime or by the vegetation they support. The following tables summarize the number of wetlands based on each of these two methods of classification.

Map 7. Aquatic Habitats and Subwatersheds



Source: National Wetlands Inventory and Washington Dept. of Natural Resources. Locations and classifications not fully ground truthed.

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Table 2–4. Number and percent of palustrine wetlands as classified by water regime occurring on the Little Pend Oreille National Wildlife Refuge.

Wetlands Water Regime	Number of palustrine wetlands	Percent of total
Seasonally flooded	138	71
Permanently flooded	21	11
Saturated Soils	16	8
Semi-permanently flooded	14	7
Temporarily flooded	6	3
TOTAL	**195**	**100**

Table 2–5. Number and percent of palustrine wetlands as classified by dominant vegetation occurring on the Little Pend Oreille National Wildlife Refuge.

Dominant Vegetation Type	Number of palustrine wetlands	Percent of total
Persistent emergent	65	33
Deciduous scrub-shrub	62	32
Deciduous forested	44	23
Open water, no vegetation	17	9
Aquatic rooted	2	1
Miscellaneous	5	2
Total	195	100

Eight wetlands (4%) were identified as being modified to some degree by beavers. One appeared to have been ditched. Dailey, Pierce, Winslow and Long Lakes are all classified as palustrine wetlands. None of these lakes supports a recreational fishery.

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Potter's Pond is the largest palustrine wetland on the Refuge and the only one with a recreational fishery. It is a man-made pond with an earthen fill dike completed in 1959 as waterfowl nesting habitat. The pond averages 15 acres but can range from 1.5 to 24 surface acres. It is fed by the same diversion that feeds the lake and is connected to Bayley Lake by an artificial channel. The lake's maximum depth is about 9 feet. Broods of Canada geese, mallards, ruddy ducks, ring-necked ducks, mergansers, and goldeneyes are commonly seen on the pond as well as pied-billed grebes, American coots, great blue heron and osprey. Shoreline shrubs provide nesting and foraging habitat for several song bird species. The lake is currently stocked with rainbow trout.

Lacustrine Wetlands

Bailey and McDowell Lakes are the only lacustrine wetlands on the Refuge. Both lakes consist of permanently flooded main basins of open water, with shallower portions containing a mix of floating vegetation dominated by pondweed.

Prior to 1973, McDowell Lake was a 33-acre beaver pond during high water years. Located on an intermittent tributary to the Little Pend Oreille River, it would nearly dry up in some years. In 1972 Washington Department of Fish and Wildlife (then known as the Washington Department of Game) built an earthen fill dam on the lake outlet, raising the water level about 10 feet, increasing the surface area to about 48 acres and creating a maximum depth of 20 feet. Water was diverted from the North Fork of Bear Creek to fill the lake using a stop log weir. To maintain the lake and comply with water rights provisions, Washington Department of Game recommended a flow of 2 cubic feet per second (cfs) be diverted to feed the lake and 3 cfs be maintained below the diversion in the stream. Pond mills were installed to provide winter circulation and prevent winter-kill. Trapping has been used in the past to control tench, an undesirable exotic fish intentionally or accidently introduced into the lake. The lake is currently stocked most years by the Department with rainbow trout. Some brown trout remaining from previous stocking.

Tench were either intentionally or accidently introduced to McDowell Lake since it was developed. As the populations of these fish increase, they degrade the habitat for more desirable trout. The State has tried different methods to remove or control the tench population, including "rehabilitating" the lake by draining it, poisoning all the remaining fish and restocking the lake with trout. These attempts have met with limited success with the tench population persisting. Current management consists of a joint effort between the State and the Refuge to trap and remove tench from the lake on an annual or semi-annual basis. This method, while not a permanent solution, does show promise.

Bayley Lake, formerly known as Cliff Lake, was enlarged by a rock and cement dam at the southern end of the lake in the 1920s. A private fish hatchery was built at the southeastern end of the lake by Mr. Bayley. Water was diverted from Bear Creek for the hatchery water supply and to fill the lake. A sink-hole near the dam resulted in a leak in the lake, causing problems at the hatchery. To fix this leak, clay was piled on the ice near the sink hole, filling the hole in the

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spring when the ice melted. Bayley sold his property to the Fish and Wildlife Service in 1940. The lake continues to leak, presenting the challenge of maintaining lake water levels. Bayley Lake surface acres vary from 18 to 72 acres. Despite unstable water levels, or perhaps because of them, the lake is rich in aquatic invertebrates which supply a hearty diet to stocked rainbow trout which have been known to reach the seven pound class. The lake also contains eastern brook and brown trout.

Riverine Wetlands

The river and streams found on the Refuge can be divided into two main classifications: perennial and intermittent.

Perennial streams are those that flow year around. Included in this classification is the Little Pend Oreille River, of which about 9.9 miles flow through Refuge lands. Bear Creek and the North Fork Bear Creek account for about 14.6 miles of perennial stream while other smaller perennial streams such as Cedar, Norman, and Olson Creeks, as well as several smaller unnamed tributaries, account for another 25.9 miles. Perennial streams are very likely under counted by the National Wetlands Inventory. Pyle (pers. comm.) Estimated that as many as 50% of the streams classified as intermittent may in fact be perennial.

Both the Little Pend Oreille River and Bear Creek display two distinct stream forms within the Refuge. Approximately 3 miles of the Little Pend Oreille River and 5 miles of Bear Creek flow through wide, flat valleys with well developed alluvial flood plains. The water is moving considerably slower in these reaches than in the higher gradient reaches of the stream, and the stream bottom is mostly gravel or sand with occasional patches of rocks or cobbles.

The remaining portions of these streams are higher gradient, meaning the water is flowing faster through narrower channels with little flood plain development. The stream bottom in these reaches is mostly rock, cobbles, or gravel with occasional patches of sand

The second main class of riverine systems on the Refuge are the intermittent streams; creeks that flow only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent. Intermittent streams are defined as having surface water present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. There are about 33 miles of intermittent streams on the Refuge.

Riparian and Stream Conditions

Riparian areas are also important to humans. At the Refuge, some riparian areas have been converted to open fields for agriculture. They have been important areas for grazing because of productive soils and abundant water for livestock. Water has been diverted from streams for many purposes, including irrigation and lake development. Many Refuge roads were built in river bottoms or parallel streams. Camping is concentrated near Refuge creeks and the Little

Pend Oreille River. All these activities have had negative effects on the function of riparian systems within the Refuge.

In conjunction with the planning process, the Fish and Wildlife Service did assessments of riparian and in-stream fish habitat conditions. The riparian condition survey was conducted on the Service owned portions of the Little Pend Oreille River, Bear Creek and North Fork of Bear Creek using survey and classification procedures described by the USDI Fish and Wildlife Service and the USDI Bureau of Land Management (Pyle 1997). Valley units were delineated and visited. Riparian resource condition and functional condition were determined based on a thorough examination of site characteristics and classified as being in either in proper functioning condition or functioning at risk.

Approximately 5 of the 8.5 miles of Bear Creek surveyed were classified as being in unsatisfactory condition. Of the approximately 7.5 miles of the Little Pend Oreille River surveyed, about 2 miles were classified as being in unsatisfactory condition. These unsatisfactory areas were mostly in the alluvial, low gradient troughs that comprise more than 50% of the total riparian habitat occurring on the Refuge. Attributes of these riparian areas characterizing an unsatisfactory condition included excessive stream bank erosion, increased channel entrenchment, lowered water tables, reduced extent of active flood plain, and a diminished composition of the hydric riparian species expected to occur in a fully functional riparian system (Pyle 1997). The Map 8 illustrates the results of that survey.

A fish habitat assessment of the portions of the Little Pend Oreille River flowing through the Refuge was conducted in 1996, with a similar assessment conducted both Bear Creek and North Fork Bear Creek in 1997. The objective of these surveys was to characterize stream and riparian habitats; determine fish species presence, distribution, size structure and community composition; and examine relationships between fish populations and habitat characteristics (Kelly-Ringel 1997, 1998).

Fish habitat assessments of the Little Pend Oreille River and Bear Creek were conducted in 1996 and 1997, respectively. The Little Pend Oreille project surveyed about 9.5 miles of the river starting at the Refuge's western boundary, culminating below Crystal Falls. Six reaches were intensively surveyed and the following parameters measured: water temperature; pool frequency; bank stability; sediment; frequency of large woody debris; and riparian vegetation. While there was some variation in the scores for each of these parameters in each of the 6 reaches, reach number 2, which extended from the western boundary of the Refuge to the bridge at Cottonwood Campground, scored below the standards described in the Interior Columbia Basin Ecosystem Management Project. This reach coincides with the low gradient alluvial portions of the river found to be in an unsatisfactory condition during the riparian survey. The substandard condition of this reach is attributed to past logging/clearing of the valley, as well as livestock grazing and deer browsing. The upper reaches in the higher gradient and forest areas of the Little Pend Oreille River were in significantly better condition as fish habitat, with livestock grazing, deer

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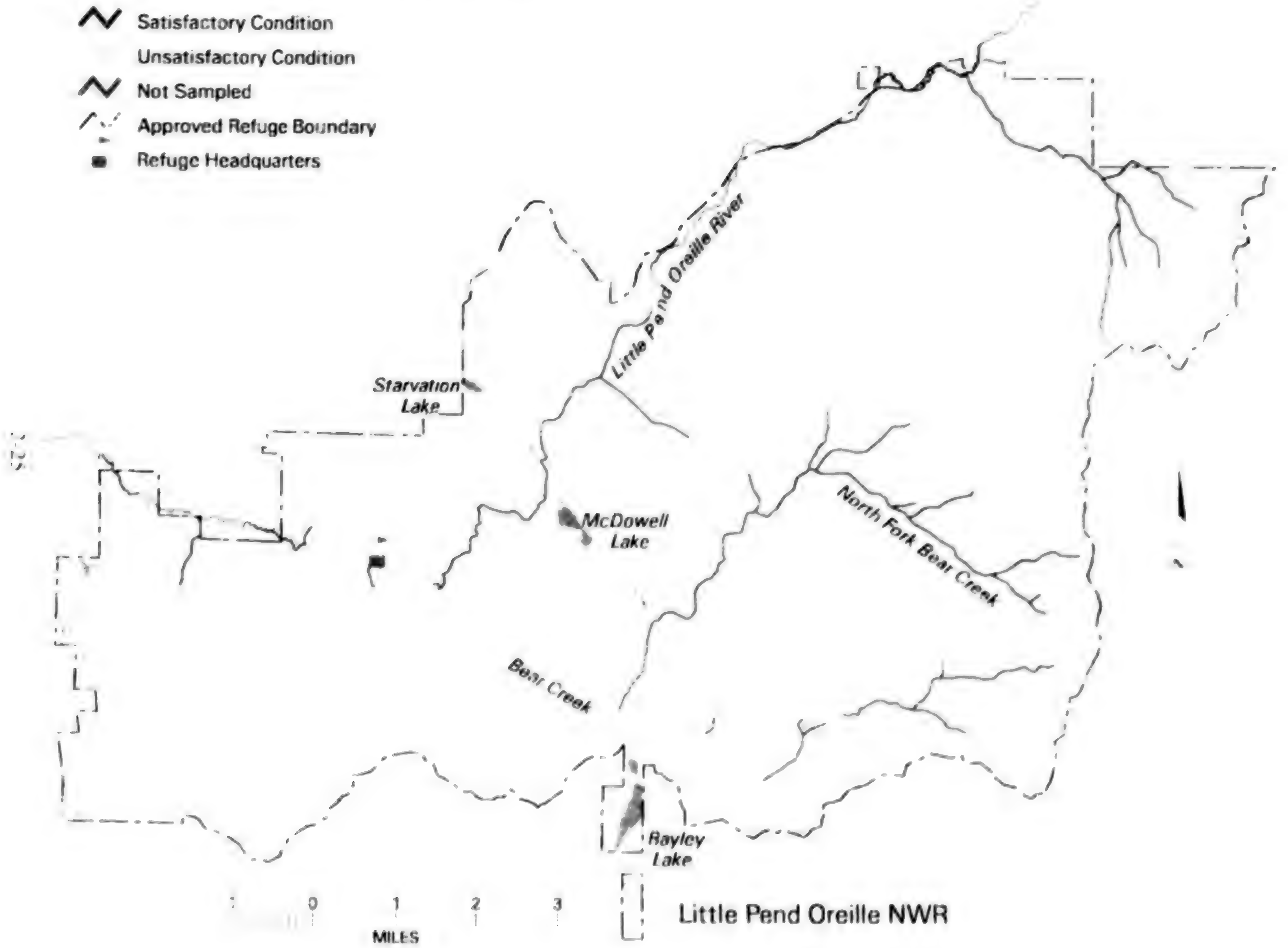
Map 8. Riparian Condition Survey



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browsing, timber harvest and recreational use all having some limited impact in specific areas along these reaches (Kelly Ringel 1998).

Four reaches were designated along Bear Creek and were assessed as fish habitat in 1997. Reach 2 was a braided marsh, while reaches 1, 3 and 4 were riverine. Although several factors were discussed, the consistent theme in these three riverine reaches were the impacts livestock grazing were having on the stability of the creeks banks. These reaches coincide with those found to be unsatisfactory during the riparian condition survey.

These surveys discovered several factors common to both streams that affect fish habitat and may alter or limit productivity. Significant erosion has been noted in some areas and has largely been attributed to soil type, exacerbated by cattle grazing. Such impacts to stream banks can add sediment to streams, accelerating deposition into pools and gravel beds that are needed by trout and other fish. Gravel beds are important for spawning and incubation, and deep pools and cover are needed for juvenile and adult fish to survive through the winter. These problems are further complicated as streams erode, becoming wider and shallower, and vegetation is lost that provides shade, nutrients, structure and stability to riparian systems. Other factors within the watershed can also contribute to riparian degradation, such as roads and timber management (Kelly Ringel 1998).

Both reports indicated that certain portions of the Little Pend Oreille River, Bear Creek and North Fork Bear Creek, particularly the lower gradient flood plain or "alluvial" areas, have been compromised or degraded from past use and management. These alluvial valleys are among the most important areas of the Refuge. Frequent floods of various extent have, over time, formed diverse habitat in these valleys featuring sandbars, off-channel sloughs and wetlands, and a wide range of plant species, all of which are important to wildlife. However, these initial studies indicate that in some sections in the alluvial valley, streams are widening, becoming more shallow, the banks are unstable, there is a lowering of the water table, and there is insufficient stream-side vegetation to provide shading. Stream-side vegetation is also an important source of nutrients, providing downed wood to the stream and helping stabilize the stream bank. Because of the wildlife implications, the degradation and restoration of these lower valleys is an important issue for the Refuge.

Old Fields

When the Fish and Wildlife Service began managing the Refuge in 1939, it included approximately 500 acres that homesteaders and former land owners had actively farmed and another 500 acres that produced grass hay or were used as livestock pastures. The Refuge continued a farming program in many of these fields or allowed permittees to graze cattle and horses in them. These farmed fields ranged in size from 1 to 92 acres and were scattered through the west side of the Refuge. Most crops were wildlife food oriented such as sweet clover, winter wheat, rye, oats, barley, alfalfa, and vetch targeted for deer and other species. Former Refuge staff felt these food plots helped reduce heavy use of browse by deer. Most

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cultivated fields were replanted every five years. Other fields were maintained in perennial grasses, mainly timothy, orchard grass, red top, blue bunch wheat grass, Kentucky bluegrass and crested wheat grass. Sharecroppers removed much of the hay grown on the refuge, but a portion was stored or left in the field for supplemental deer feeding.

Of the 443 acres of agricultural land on the refuge in 1965, when the Washington Department of Fish and Wildlife (WDFW) began managing the refuge, 313 acres were still tillable. Forest succession was reclaiming the remaining 130 acres with pine and Douglas-fir. WDFW records show an average of 100 acres per year being farmed in the 1970s.. Many of these fields, which ranged in size from 10 to 92 acres, were maintained in crops until 1989, when the State decided to phase out their annual cropping of tillable land for budgetary reasons. By 1988, 494 acres of perennial grass fields remained. These consisted of 9 parcels, each ranging from 4 to 62 acres. WDFW recommended converting these grassland acres to crested wheat grass. WDFW reports maintain that irrigation was necessary to make these fields productive and that they would need new expensive equipment to maintain the farm program. They began planting many of these fields to small Burnet, a perennial evergreen forb, and in 1988, had almost 100 acres in this plant. Currently most of these old fields and pastures have been invaded by undesirable weeds like St. John's wort and knapweed. Small Burnet, a very desirable plant for big game and birds, has become increasingly rare.

A recent analysis of Refuge aerial photos revealed 58 openings or meadows greater than 1 acre in size that can be classified as old fields. Totaling 631 acres, they ranging in size from 1 acre to greater than 60 acres, with an average size of 11 acres. They include large bottomland alluvial meadows along the Little Pend Oreille River as well as the small remnants of old homestead fields surround by forest. Many of these old fields or meadows are shrinking as trees invade along their edges. Several also contain the remnants of fruit orchards planted by homesteaders. Several of these meadows are either moist or wet soil types, especially, but not limited to, the ones along the low gradient portions of Bear Creek and the Little Pend Oreille River. Other, more upland fields, contain well drained soils.

Vegetation on these fields range from thick stands of redtop, timothy, or orchard grass to dense infestations of exotic weeds including St. John's wort and knapweed. Most of these meadows are included in livestock grazing allotments. Two small fields near the southwestern corner of the refuge, totaling about 30 acres, are under a special-use permit to a neighboring land owner. These fields are planted to alfalfa, and the permittee is allowed one cutting of hay each year. No other agricultural cultivation has occurred on the refuge since 1989.

2.3 WILDLIFE, FISH, AND RARE PLANTS

The Little Pend Oreille National Wildlife Refuge encompasses habitat for the vast majority of wildlife species inhabiting northeastern Washington. The Refuge includes parts of all the major forest zones in the state, from the dry forest of the ponderosa pines through the moist, mixed conifers, to the cold forest of Engelmann spruce and subalpine fir zone. Not only is the Refuge one of the largest Refuge in the state, it's bordered by the Colville National Forest on two sides, essentially magnifying its value for wide ranging wildlife species.

The Refuge is home to a wide variety of terrestrial vertebrates. The Washington State Gap Analysis Program (WAGAP) is part of a national program that identifies conservation priorities and "gaps" in the protection of biological diversity at a landscape scale by mapping land cover, modeling vertebrate distributions, and overlaying land cover and vertebrate distributions with land management type. In 1998, this procedure was applied to all 22 National Wildlife Refuge in Washington. The results of that analysis for the Little Pend Oreille NWR are shown in the following table.

Table 2-6. Wildlife species predicted by Washington GAP project to be present on Little Pend Oreille National Wildlife Refuge.

Taxonomic Group	Number of species found in Washington	Number of species predicted for LPO NWR	Percent of WA species predicted for LPO NWR
Amphibians	24	6	25
Reptiles	21	8	38
Mammals	111	58	52
Birds	240	196	82

Given the wide diversity of species found on the Refuge, a discussion of all endemic species would be impractical. However, some important wildlife-habitat relationships will be discussed because of their apparent significance for management or because of the attention they have received during the planning process. Migratory birds are of particular interest due to being mentioned in the Executive Order establishing the Refuge. Proposed, threatened and endangered species, Comprehensive Conservation Plan evaluation species and other selected wildlife and be fish species will be highlighted. More complete treatments of wildlife-habitat interactions will be detailed in subsequent habitat management plans after completion of the Plan. A complete list of wildlife species known or predicted to inhabit at the Refuge is included in Appendix H.

Federally Proposed, Threatened or Endangered Species

The only federally listed threatened and/or endangered species known to regularly occur on the LPO is the bald eagle. Bald eagles are frequently seen along the Little Pend Oreille River in winter time. These overwintering birds are foraging in the open water along the river as well as scavenging winter-killed deer on the nearby deer winter range.

Both adult and sub-adults were observed on several occasions during the spring and summer of 1998 perching and flying around Bayley Lake. There are no known nesting sites on or near the

LPO NWR. These eagles are likely birds that have not established breeding territories and are utilizing the lakes as foraging habitat.

Peregrine falcons historically nested in this portion of Washington, and a peregrine falcon was reported near the cliffs along Bayley Lake as late as 1995. However, no known falcon eyries are currently active on the refuge, and sightings are very rare.

Although the Little Pend Oreille NWR is within the historic range of both gray wolf and grizzly bear, the refuge is outside of the designated recovery areas for these species. A grizzly was illegally killed approximately 12 miles north of the refuge in 1997. Another confirmed grizzly sighting occurred near the town of Deer Park, about 40 miles south of the Refuge , in 1996 (Wisneiski 1998). Possible gray wolf sightings have been reported at Bayley Lake as recently as November, 1998. Obviously it's possible that individuals of these species may occasionally pass through portions of the refuge.

Ute ladies' tresses (*Spiranthes diluvialis*) is perennial orchid currently listed as threatened under the Endangered Species Act. It occurs in relatively low elevation riparian, spring and lakeside wetland meadows. First described as a species in 1984, it has been found in Colorado, Utah, Nevada, Wyoming and Montana. The discovery of this species in Okanogan County in 1997 opens the door to its possible existence in other arts of eastern Washington. A vascular plant inventory conducted on the Refuge in 1995 and 1996 failed to detect the plant (Wood 1997). No surveys focusing on this species have since been conducted on the refuge.

The plant seems to require alkaline or high pH soils. While there are several areas on the Refuge such as wet meadows and seeps having the moisture conditions favoring the plant, recent soil analyses indicate the Refuge soils tend to be acidic. Therefore, the potential for Ute ladies' tresses to exist on the Refuge is likely quite low.

Canada lynx has recently been proposed by the U.S. Fish and Wildlife Service for listing under the Endangered Species Act. Several old records indicate lynx were present on the refuge earlier in this century, including a specimen stored in the Smithsonian that was collected by a government trapper near the eastern end of the refuge in 1940. Tracks have been reported in the same general area within the last 2 years.

The high elevations found along the eastern portion of the refuge provide some potential habitat for Canada lynx populations. Sightings are rare in the region probably due to the lynx's elusive nature and because it frequents the region only sporadically. The areas surrounding the Refuge contain a mix of habitat patches that are favored by the lynx, including late successional coniferous forest providing denning habitat and young, dense stands of lodgepole pine that support their primary prey species, snowshoe hare. Habitat for lynx on the refuge proper is probably limited due to the relative lack of dense stands of young lodge pole, and a limited amount of area above 4500 feet elevation.

Although more information is needed about the specific requirements for lynx populations, it is likely that lynx migrate from Canada when northern population levels are high or when prey species are in decline (Ruggerio, et al. 1994). The refuge lies within lynx management zones established by the Washington Department of Natural Resources *Lynx Habitat Management Plan (WDNR 1996)*. The plan characterizes the refuge as a place lynx may disperse into, but this area is not critical to the long term persistence of their populations. A survey begun in August, 1998 will hopefully yield more information about current lynx use in this area and adjacent Washington DNR and U.S. Forest Service property.

Other species of special interest, including state endangered, threatened, and candidate species, U.S. Fish and Wildlife Service species of special concern and U.S. Forest Service designated sensitive species, are listed in Appendix H.

USFWS Nongame Bird Species of Management Concern: The Fish and Wildlife Conservation Act, 1980, requires that the Service identify "all migratory nongame birds that, without additional conservation action, are likely to become candidates for listing under the Endangered Species Act of 1973." Additionally, the Act further underscores the need to develop actions to assure the conservation of these species with the underlying philosophy that "an ounce of prevention is worth a pound of cure." Species of Management Concern (SMC) known to regularly occur on the Refuge include the: Rufous hummingbird, olive-sided flycatcher, hermit warbler, and Vaux's swift.

Partners in Flight Landbirds Program Conservation Priorities: The interagency Partners in Flight Program Conservation Program recently completed as assessment of the status and conservation needs of birds inhabiting all types of upland habitats. This assessment included consideration of population trends, habitat trends, and threats on breeding and wintering grounds. National, regional, and more local conservation priorities were determined. These species represent conservation priorities for the Service, and other PIF partners including the Washington State Department of Wildlife, the USFS, and other governmental and private partners. Multi-agency PIF conservation strategies are currently under development which will guide management activities at the local and regional scale. In addition to the SMC species listed above, other species of high PIF conservation priority which occur on the Refuge include the: willow flycatcher, MacGillivray's's warbler, white-headed woodpecker, flammulated owl, and pygmy nuthatch. Appendix H lists all birds which occur on the Refuge and identifies those ranked as high conservation priorities by PIF at the local and regional scale.

Evaluation Species

Twelve vertebrate species were chosen to represent several important habitat types found on the Little Pend Oreille NWR. While not necessarily representing the complete spectrum of biodiversity inhabiting the Refuge, these evaluation species provide insight in to how the various alternatives will affect the major habitats found here.

Several criteria were used in species selection. First, they needed to represent the major habitat types occurring on the refuge, including lakes, streams, forests and open fields. Forest types were further defined as dry, moist or cold with emphasis placed on the mature ages. Unique forest habitats that would be impacted by the alternatives, such as aspen stands, low elevation ungulate winter range and riparian areas, were also targeted. When possible, special status species, species of management interest or species identified by ICEBMP as having experienced severe losses in habitat were selected. Finally, an effort was made to include a variety of taxon in the list.

Table 2-7. Species used to evaluate the effects of the proposed alternatives on important wildlife habitats.

Species	**Habitat**
Bald eagle	lakes, streams
Canada lynx	cold forest
Columbia spotted frog	riparian
Northern goshawk	mature moist forest
MacGillivray's warbler	riparian woodland/shrubs
Common Goldeneye	lakes
Flammulated owl	mature dry forest
White-tailed deer	low elevation forest
Pileated woodpecker	mature moist forest
Rainbow trout	lakes, streams
Ruffed grouse	aspen
Hoary bat	open areas, mature forest

These evaluation species were used only to assess the broad impacts of this comprehensive conservation plan. They are not management indicator species since they will not be used to monitor and evaluate the success of any future management programs. After the comprehensive conservation plan is finalized and adopted, a site-specific habitat management plan will be developed. That step-down plan will include specific methods for evaluating the success of the planned projects and programs.

Birds

Information on Refuge bird life comes from several different sources. Early Refuge narratives provide some survey records as well as anecdotal information about birds observed by Refuge workers. Records kept by the Washington Department of Fish and Wildlife from 1965 through

1994, also contain some useful information. Most information has been collected since 1994, through breeding bird surveys, point counts, waterfowl breeding pair and brood surveys, mist netting for an avian productivity and survival monitoring project, and by incidental observations by Refuge staff.

Based on WAGAP analysis projections, the Little Pend Oreille NWR supports at least 123 native breeding bird species. Bird observations by Refuge staff indicate this is likely an underestimate. The high number of breeding birds found on the Refuge is due primarily to the Little Pend Oreille's encompassing five of the forest zones found in northeast Washington.. Additionally, the Refuge provides habitat for several breeding species more typical of the eastern North American or boreal forest north of the state that only enter into Washington in the northeastern portion of the state (e.g., the northern water thrush and American redstart). The Refuge also supplies a major part of the protected range in Washington for red-necked grebe, black tern, bank swallow, and gray catbird.

Waterfowl

Many species of waterfowl have been observed on Refuge lakes and wetlands during waterfowl breeding pair and waterfowl brood surveys. Duck species commonly seen include: mallard; ruddy duck; redhead; common goldeneye; ring-neck duck; bufflehead; wood ducks; green-wing, blue-wing and cinnamon teal; and common and hooded mergansers. Canada geese also breed on several Refuge lakes and wetlands as do red-necked grebes. Harlequin ducks have been observed along portions of the Little Pend Oreille River within the Refuge boundaries but no nest activity has been detected. American dippers are also sighted along this river. American coots are quite common on all Refuge wetlands, along with passerine species such as red-winged and yellow-headed blackbirds. A small great blue heron rookery existed on the Refuge until 1996 when it was destroyed by a windstorm. Although herons are commonly seen on the Refuge, no new nesting colony has been found. A pair of ospreys are commonly observed foraging in Bayley and McDowell Lakes as well as other areas of the Refuge. These birds probably represent a breeding pair, however a nest has not been located. Bald eagles are commonly seen in the winter along the Little Pend Oreille River.

The creation of Bayley and McDowell Lakes and Potter's Pond converted portions of these shallow wetlands into permanent deep water habitats. This conversion reduced the amount of shallow water wetland available on the Refuge, but produced much more deep water habitat than was naturally available on the area. These three lakes all continue to have a shallow water component, albeit drastically reduced from what was available before they were impounded. This increase in deepwater habitat complements the existing shallow water habitat remaining on these sites as well as that found on other Refuge wetlands such as Dailey and Long Lakes.

The potential major threat to Refuge waterfowl and other wetland bird productivity is on these deeper lakes. The disturbance caused by the high number of anglers using these lakes during spring and early summer may be reducing breeding success or displacing nesting pairs. Whether this use is having a significant negative impact on wetland bird production has not yet been determined.

Riparian Birds

Mist netting in wooded riparian habitat along the Little Pend Oreille River has yielded a list of species breeding in those areas of the Refuge. Species captured in these nets include:

American redstart
northern waterthrush
Swainson's thrush
warbling vireo
solitary vireo
American robin
orange-crowned warbler
yellow warbler
MacGillivray's warbler
Wilson's warbler
Townsend's warbler
common yellow-throat
Hammond's flycatcher
dusky flycatcher
willow flycatcher
least flycatcher
song sparrow
chipping sparrow
cedar waxwing
red-napped sapsucker
winter wren
dark-eyed junco
western tanager
pine siskin
red crossbill
golden-crowned kinglet
black-capped chickadee
browner creeper
ruffed grouse
common snipe

The primary threats on the Refuge to riparian breeding species stems from habitat degradation caused by past and present livestock grazing, agricultural practices, and recreational use.

Dry Forest Birds

The low elevation ponderosa pine dominated dry forest provides habitat for several species of birds, some found nowhere else on the Refuge. Birds use all structural forms of dry forest, from young stands and brushy openings, to old forests, including dead trees and downed logs. The presence of riparian vegetation along permanent and seasonal waterways within the dry forest brings in several additional bird species. Many species of woodpeckers use dead trees in this forest type for nesting. Their excavations also provide nesting cavities for several bird and mammal species that cannot excavate their own. Large raptors, including owls, hawks and eagles, hunt for food in openings or the open stands of trees found in the dry forest type. This is also the portion of the Refuge that supports the majority of the introduced wild turkey population.

Much of our information comes from point counts done in preparation for vegetational treatments in these areas, and through casual observations by Refuge personnel. Species commonly observed during the point counts on these areas include chipping sparrow, dark-eyed junco, hairy woodpecker, white-breasted and red-breasted nuthatch, spotted towhee, Hammond's flycatcher, mountain and black-capped chickadee and yellow-rumped warbler. Many of these species are not limited to dry forest habitats and are found in several habitats and elevations throughout the Refuge. However, white-headed woodpeckers do prefer these dry ponderosa pine sites and are often observed foraging in these areas.

Another species expected to be occupying this area in preference to other Refuge habitat is the flammulated owl. A juvenile flammulated owl was sighted in this area of the Refuge in 1997, indicating the species is nesting in the vicinity. However, until nocturnal owl surveys are performed, the relative density and species composition of owls in this area cannot be accurately determined.

Human activities, such as timber harvest and fire suppression, have greatly altered the vegetative structure of this forest type. Removal of large trees has reduced the number of sites available to snag dependant species. Fire suppression has also reduced the number of trees available to become snags, as well as causing overstocking of stands by young conifers, and reducing the density and diversity of shrubs. These factors are the main threats to bird habitat in the dry forest type.

Moist Forest Birds

Very little specific information exists about specific bird populations and species diversity of the moist forest type on the Refuge since little survey work has been conducted there. Based primarily on information contained in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) Eastside Draft Environmental Impact Statement (USDA Forest Service 1997) the multiple canopy layers found in moist forests are expected to provide a wide variety of bird habitat. Species typical of the moist forest type that are found on the Refuge include northern goshawk and pileated woodpecker.

Small and scattered aspen stands also provide diversity in moist forests. These are very important nesting and feeding habitat for several species of birds such as the red-naped sapsucker, western tanager and Swainson's thrush.

On the Little Pend Oreille, past timber harvest has resulted in a shortage of large, mature to old growth trees needed for the single layer canopy they provide, as well as a source of large snags and down logs. Fire suppression has drastically reduced the occurrence of young stands that result from this and other forms of disturbance. Finally, lack of disturbance, coupled with livestock browsing on the limited number of aspen spouts, has hampered aspen regeneration, threatening some of these aspen stands to die out.

Cold Forest Birds

Very little data is available describing bird species composition or populations on the cold forest portions of the Little Pend Oreille. No systematic bird survey has been done on this part of the Refuge to date; what information exists comes from incidental observations by Refuge personnel.

The ICBEMP Eastside Draft EIS, states that although many bird species use both moist and cold forest types, fewer birds use cold forests. This is due to lower diversity in tree species, fewer insects and a shorter growing season. Red-tailed hawks and great-horned owls forage on the voles and squirrels that inhabit these areas. Although still rare, boreal and great grey owls have moved down from Canada into cold forests. Snags are important for hairy, black-backed, and three-toed woodpeckers.

The cold forest areas are the only places where spruce grouse have been documented on the Refuge. Blue and ruffed grouse also inhabit these areas, with blue grouse using them specifically for wintering habitat.

Ruffed grouse is a common game bird on the Refuge. It inhabits a wide variety of habitats including ponderosa pine, mixed conifer, and riparian areas. Aspen is a very important component of grouse habitat used for both feeding and breeding (Thomas 1979, Cade and Sousa 1985).

Deciduous woody stems are very important component of hiding cover for grouse, allowing grouse to see approaching predators. Throughout their range grouse prefer drumming display sites that are surrounded by moderately dense woody stems (Cade and Sousa 1985). Mid-seral aspen stands provide optimum vertical cover from fall through spring and suitable snow conditions for snow-burrow roosting during winter (Gullion and Svoboda 1972 *in* Cade and Sousa 1984). Conifers can also provide necessary cover, however, densities of ruffed grouse in conifer dominated covers tend to be lower than in aspen dominated habitats.

Burning can improve grouse habitat by maintaining an interspersion of young through mature successional stages of forest (Sharp 1970 *in* Cade and Sousa 1984). Grazing by livestock can adversely affect brood habitat (Robertson 1976; Stauffer 1983 *in* Cade and Sousa 1984).

Most aspen stands on the Refuge are decadent, with little evidence of active regeneration. Suppression of fire and other disturbances have inhibited the sprouting and subsequent expansion of the existing aspen copses. In addition, browsing by domestic livestock on the limited aspen suckers has also impaired the development of multi-aged and structurally diverse aspen stands. While the existing mature aspen trees do provide some winter food for grouse, the lack of sprouts and saplings needed for fall to spring cover, as well as a source of recruitment for mature trees, limits the potential value of these stands as ruffed grouse habitat. Fire suppression has also allowed large numbers of lodgepole pine and ponderosa pine seedlings to become established in stands historically dominated by mature ponderosa pine. This degrades these areas as grouse habitat by increasing the bird's susceptibility to predation, as well as discouraging the establishment of the more desirable aspens and deciduous woody shrubs.

Declining populations have been documented in some species that use cold forests such as northern goshawk, Vaux's swift, pileated woodpecker, and Hammond's flycatcher; and in species using riparian habitat in cold forests such as MacGillivray's warbler and the song sparrow.

The loss of old stands and large trees and snags, whether through natural or human caused disturbance, is probably the greatest threat to the cold forest areas found on this Refuge.

Mammals

Due to its undeveloped setting and the large number of vegetation zones it covers, the Little Pend Oreille NWR is predicted to have 52 native mammal species (Cassidy et al. 1998).

The Refuge is well known in the state and the region as an important wintering area for white-tailed deer herds. Deer migrate down the Little Pend Oreille River valley and from surrounding higher elevation habitat to winter on the Refuge to take advantage of the milder microclimate found on the lower elevation, ponderosa pine dominated areas.

The Fish and Wildlife Service has very limited information on the population, age structure, and harvest rate for white-tailed deer. Refuge staff have recently instituted several seasonal deer counts to monitoring the area's deer population. Information is now being collected on the age and sex of harvested deer. Until better information can be gathered and analyzed, best estimates have the winter deer population on the Refuge being 3 to 4 times higher than the summer population. Officials from Washington State Department of Fish and Wildlife maintain that winter habitat is an important limiting factor on the deer population in northeastern Washington, making the Refuge critical to the overall population of white-tailed deer in this area. Residential development of private lands adjacent to the Refuge's western boundary is increasing, reducing the amount and value of this land as deer winter range. The continuing loss of critical seasonal habitat increases the importance of the remaining winter range protected within the boundaries of the Refuge.

In 1941, the Service began planting bitterbrush, serviceberry, chokecherry, rose, and dogwood throughout the portion of the Refuge used by white-tailed deer for winter range. The 1951 Fish and Wildlife Service Annual Narrative reported that hay and salt were placed on the higher range to slow deer migration and minimize use of these rehabilitated areas and reduce crop depredations on neighboring farms.

Other wild hoofed animals using the Refuge are mule deer, elk, and moose. Mule deer are native to the area, and maintain themselves at relatively low numbers in the higher elevations of the

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Refuge. Suitable habitat, such as higher elevation natural meadows, is relatively limited on the Refuge. The resident population seems to be following the downward trend observed in this species throughout northeast Washington. Their relative scarcity makes estimating the Refuge population very difficult. There were no reports of mule deer harvested from the Refuge during the 1997 hunting season.

Moose began to appear in the Selkirk Mountains in the early 1950s, having expanded their range southward from British Columbia. Their population has increased rapidly with moose now found throughout northeastern Washington (Zender pers.comm.). Moose are seen occasionally on the Refuge throughout the year; no population estimate is available at this time. Since the population continues to increase in this region, moose are expected to become more common on the Refuge in the future.

Elk are probably not native to this portion of Washington. Several releases were attempted earlier in the century, but it was not until the elk were transplanted in the Pend Oreille Valley in the late 1960s that success was seen (Zender pers comm.). These elk expanded their range westward into other areas of suitable habitat next to the Refuge. While occasional sightings, tracks, and other sign are reported on the Refuge, elk are not using the Refuge on a regular basis. The Washington Department of Fish and Wildlife are concerned that elk using the traditional white-tailed deer winter range may consume a significant amount of forage, reducing the quality of the area as deer range. Elk have not increased their use of the Refuge over the last several years. However, an improvement in habitat quality or other management action, combined with an increase in the elk population, may result in more elk inhabiting the Refuge.

Black bears, cougars, coyotes, and bobcats all inhabit the Refuge. Estimating the population size of any these large predators is very difficult, and no dependable estimates exist for this area. However, the number of sightings by local residents seems to be increasing. Populations of these species on the Refuge are probably stable.

Other wide ranging forest carnivores, such as the wolverine, marten, and fisher, could potentially use the Refuge. A dead fisher, originally released in Montana, was found about 2 miles east of the Refuge boundary in 1994. Survey work conducted by the Washington Department of Fish and Wildlife in 1996, on areas directly adjoining the Refuge, failed to detect any fishers (Zender pers. comm.). While some suitable habitat may be available on the Refuge for this species, it is unlikely that any fishers currently inhabit the area.

Wolverine inhabit northeastern Washington, with occasionally sightings reported to the State's Department of Fish and Wildlife. There are no records of wolverines on the Refuge, but since these animals have been recorded using home ranges between 38 and 350 square miles, it is always possible a wolverine may spend some time on the Refuge.

Historically, American marten were common throughout northeastern Washington. Due to such things as habitat loss and harvest pressure, marten are now uncommon in this area (Zender pers comm.). A reintroduction effort was attempted by the State in 1989, releasing 12 marten in the Olson Creek area along the eastern side of the Refuge. None of these animals were observed again and their fate is unknown. Subsequent track surveys and photographic surveillance sites have found a few marten using the Little Pend Oreille Lakes area about 6 miles north of the Refuge boundary. No marten have been recorded on the Refuge. Several areas of the Refuge contain probable habitat for marten, and surveys to detect this species are planned.

The Refuge supports some small mammals that occur only in the northeastern part of the state, such as the pygmy shrew and the red-tailed chipmunk. Small mammal trapping in the dry forest area of the Refuge resulted in the capture of yellow pine chipmunk, red squirrel, northern flying squirrel, long-tailed vole, and deer mouse.

Columbian ground squirrels and pocket gophers still inhabit the Refuge, although records indicate they were much more common at one time. According to Refuge records, as many as 5,000 acres were poisoned in the 1940s and 1950s to control these rodents.

Aquatic species - Fish

The Little Pend Oreille River (9.87 miles) and the main fork and North Fork of Bear Creek (14.56 miles) provide most of the in-stream fish habitat managed on the Refuge. A fish habitat assessment was conducted in 1996, on the portions of the Little Pend Oreille River that are managed by the Fish and Wildlife Service (Kelly Ringel 1998). The assessment found four trout species present: rainbow; cutthroat; brook; and brown. Rainbow and cutthroat trout are native species, though the genetics of both species have been significantly modified by interbreeding with stocked fish. Brook trout were introduced from the eastern United States and brown trout are native to Europe. Native non-game species observed were redside shiner and shorthead sculpin. There may be other species of sculpin present that were not detected. Yellow perch, a non-native species, was detected above Crystal Falls. Although not found during this study, a largemouth bass was caught by an angler near the Refuge headquarters in 1997 (Cline pers. com.). Map 9 shows the reaches and fish distribution patterns found by Kelly-Ringel's study for the Little Pend Oreille River.

The assessment found that brown trout were the most prevalent species in the lower reaches of the river where the water was warmer, the flow slower, and more pools existed. They were present in small numbers in the middle reaches and absent from the upper reaches. Densities of brook trout were lowest in the lower reaches, more abundant in the middle reaches, and the only trout species found in the upper most reach on the Refuge. Rainbow trout were at their lowest density in the lowest reach, then were at relatively high densities in all the other reaches except the upper most were they were not found. Cutthroat trout were widespread but in low densities. Their densities did increase in the higher gradient portions of the river.

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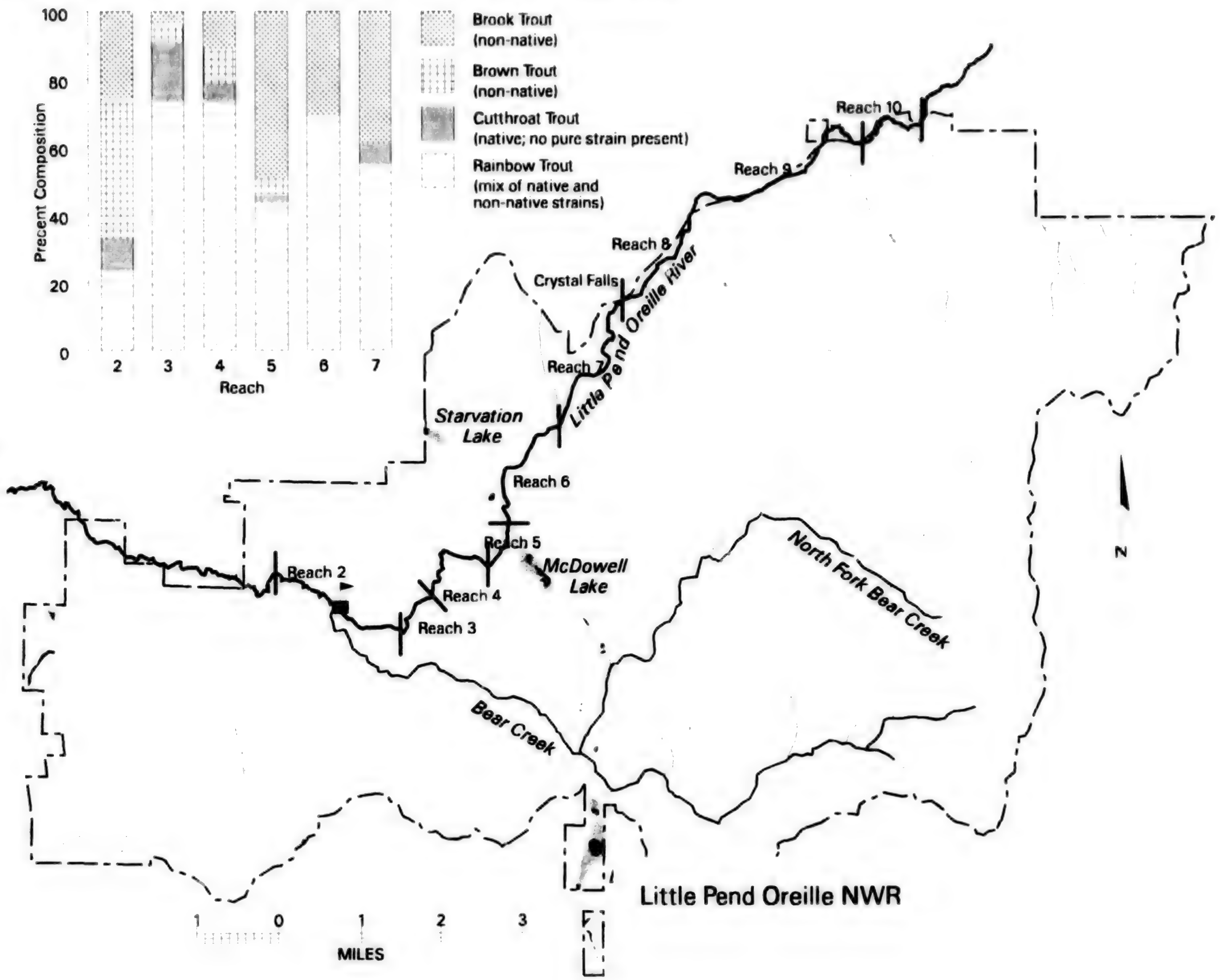
Map 9. Fish Distribution on LPO River Reaches



Ron Beitel, 12 April 1999, f:\lpo\..\fishdist.a (b + w)

Interior redband rainbow trout and westslope cutthroat trout are the strains native to this region. Coastal rainbow trout are the non-native (to this region) strain used for stocking in area streams and lakes. Most cutthroat trout stocked into this drainage are from westslope populations (Vail pers. comm.). However, non-native coastal rainbow trout have been used extensively for stocking in this portion of the state, with records of stocking in the Little Pend Oreille River and Bear Creek going back to the 1940's. The last record of fish stocking in Bear Creek dates from 1953, while the last record of fish stocking in the Little Pend Oreille River dates from 1950. Yet the repercussions of stocking can be seen today. Genetic analysis of 25 trout collected from the Little Pend Oreille River showed that the population are introgressed coastal rainbow trout, interior redband rainbow trout and cutthroat trout - which essentially means that there are no native fish left (Proebstel 1998). The major of fish display characteristics of all three to varying degrees. About 75-80% resemble rainbows with most tending toward the coastal rainbow appearance versus the interior rainbow look. Only about 20-25% resemble westslope cutthroat. None of the specimens were found to be pure cutthroat trout.

Stocking is technically barred by Service policy, but continues on many refuges today. Fish stocking does continue at the Refuge presently, but only in the three man-made lakes. These lakes would not be expected to allow passage of fish into Refuge streams except during high water.

The fish population of the Bear Creek drainage (including the North Fork) was dominated by brook trout, with rainbow a distance second and only a few brown and cutthroat trout identified (Kelly Ringel 1997). The introgession of interior redband rainbow, coastal rainbow and westslope cutthroat found in the Little Pend Oreille River would be expected to also occur in these fish. While no redfin shiners or sculpins were observed they are likely to be present.

The non-native trout present were all the result of deliberate plantings. However, the yellow perch and largemouth bass were likely the result of unauthorized introductions in the Little Pend Oreille Lakes chain, the headwaters for the Little Pend Oreille River.

The size distribution throughout Refuge streams is skewed towards small fish, with approximately 75 percent of the fish less than 6 inches in length, and nearly half of those less than 3 inches in length. Less than 1% of the fish sampled were >15 inches. The size distribution of fish is typical for a small, cold water stream such as the Little Pend Oreille River that is managed under general regulations for recreational fishing (Vail pers. comm.).

The Refuge is within the historical range of the bull trout. Fisheries biologists within the Service Ecological Services division believe that bull trout never inhabited the Little Pend Oreille River or any of its tributaries. There are no historical records of the species within this drainage and the reason appears to be due to the physical barrier at Meyers Falls (located downstream on the Colville River).

Amphibians and Reptiles

Limited inventory work has been conducted on Refuge for amphibians and reptiles. Amphibian distribution is tied to water or moist habitat conditions, necessary for egg laying. Amphibian species known or suspected of occurring on the Refuge include tiger salamander, long-toed salamander, western toad, Pacific tree frog, and Columbia spotted frog.

Climate and terrain influence reptile distribution, and most are limited to open areas and lowland habitats. Reptile species known or suspected of being present on the Refuge include painted turtle, northern alligator lizard, western skink, rubber boa, racer, gopher snake, western terrestrial garter snake, common garter snake, and western rattlesnake.

Invertebrates

Despite their enormous importance, in terms of biomass and key ecological functions, little information exists for Refuge invertebrates. Endemic forest insects such as various woodborers and bark beetles are known to be present. However, specific information on insect species composition, density and distribution is lacking.

Rare Plants

During the summers of 1995 and 1996, a vascular plant survey was conducted on the western portions of the Colville National Forest, including the Little Pend Oreille National Wildlife Refuge. While no Federally listed proposed, threatened or endangered plant species were found, a Washington State threatened species, adder's-tongue (Ophioglossum pusillum), was found on the Refuge (Wood 1997). Previously unknown from the eastern portion of Washington, a healthy population of several hundred plants was discovered in a wet meadow.

Management of this colony currently consists of excluding both livestock grazing and vehicular traffic from this meadow. The population is monitored annually to detect any changes in the colony's size or shape.

Undesirable Plants

Most Refuge habitats harbor non-native plants. Some of these plants occur incidentally but others having a tendency to invade and displace native plants are considered noxious weeds. Noxious weeds are defined by state law as any plant which, when established, is highly destructive, competitive, or difficult to control by chemical or cultural practices. These weeds are one of the most serious threats to wildlife habitats in the western United States.

The state and counties maintain weed lists which specify the control requirements for several classes of weeds. Early detection, prevention, and eradication of newly invading noxious weeds is the goal of weed control efforts. At this time there are no known occurrences of Class A weeds on the Refuge. Class-B designates require control of seed production and prevention of further spread, and in some cases, control of a buffer strip of at least forty feet in width along boundaries with adjoining landowners and along travel corridors. Weeds in this class that occur on the Refuge are leafy spurge, plumeless thistle, and yellow hawkweed. For Class B and C weeds prevention of further spread is priority along boundaries with adjoining landowners and along travel corridors. Weeds in these classes which are known to occur on the Refuge include orange hawkweed, diffuse knapweed, and spotted knapweed.

The Refuge strives to meet State law requirements to control all Class B-designate and many Class B and C weeds. Most existing Refuge weed control occurs along major roadways and in areas of concentrated public use. Chemical, biological, and mechanical methods are used, with most reliance on non-chemical methods because the Fish and Wildlife Service restricts the use of chemicals and encourages mechanical and biological control methods.

2.4 PUBLIC USE STATUS AND TRENDS

Refuge Facilities and Access

Roads

Approximately 201.5 miles of roads currently exist within the LPO administrative boundary. The majority of roads (130 miles) are located on refuge lands. However, due to the large amount of private land within the refuge's administrative boundary, about 70 miles of roads within the refuge are not managed by the FWS. All roads were classified into five different categories based on maintenance responsibilities and uses:

State Highway	State maintained, paved highway. The only road in this category is State Highway 20.
Country Roads	County maintained gravel surface roads. Three exist on the refuge: Bear Creek Road (county maintenance terminates at refuge headquarters), Narcisse Creek Road, and Buffalo-Wilson Road.
Primary Roads	Main refuge arterials, surfaces with a combination of gravel and native materials, maintained by the Refuge or the land owner. These roads provide the majority of public access to the refuge and its main recreational sites. Blacktail Mountain road is an example.
Secondary Roads	Open, single land roads with mostly a native surface road bed maintained by the land owner or the Refuge. These roads access the more remote portions of the refuge, and are open to vehicular traffic. An example is Cedar Creek Road.

Management Access Roads	Closed to all motorized vehicular access except for administrative purposes, and are seldom maintained. The Schumaker Meadow Road is an example of a management access road. This category also includes roads that are not maintained and are impassable to vehicles.

Map 10 displays all Refuge roads.

The following table displays the mileage of each class of road that occurs on the Refuge by landowner.

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Table 2-8. Miles of roads by ownership within the Little Pend Oreille National Wildlife Refuge.

Owner	Road Class	Miles
U.S. Fish and Wildlife Service	State Highway	0.4
	County Roads	4.7
	Primary Roads	26.0
	Secondary Roads	33.9
	Management Access Roads	65.6
	All	130.6
Wa. Dept. Natural Resources	**County Roads**	**0.15**
	Management Access Roads	**0.75**
	All	**0.9**
Boise Cascade	Primary Roads	0.8
	Secondary Roads	1.9
	Management Access Roads	13.1
	All	15.8
Stimson Lumber	**Primary Roads**	**5.7**
	Secondary Roads	**16.9**
	Management Access Roads	**16.7**
	All	**39.3**
Other Inholdings	County Roads	1.3
	Management Access Roads	13.6
	All	14.9
[illegible]	[illegible]	[illegible]

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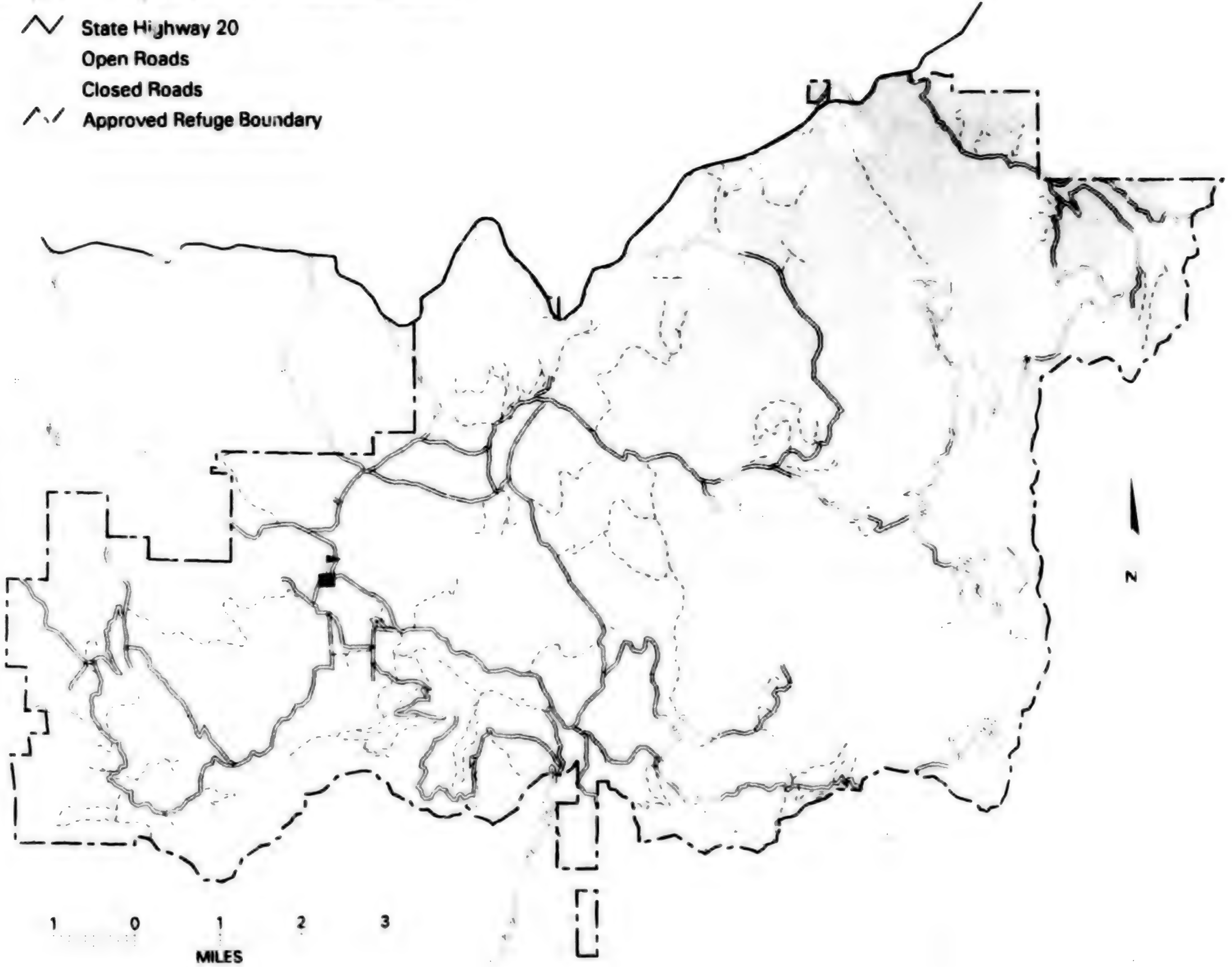
Map 10. Open and Closed Roads



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Ron Beltel, 12 April 1999, f:\lpo\. \roads a(b + w)

Through an agreement between the U.S. Fish and Wildlife Service and Stimson Lumber Company, that company has a perpetual use agreement allowing them to use Blacktail Mountain Road and Olson Creek Road to access and manage their company timber lands, as well as to use these roads to manage and harvest lands not within the refuge. Boise Cascade Corporation does not have a similar agreement, and negotiates use of refuge roads for their management activities on a case-by-case basis.

The density of roads, measured in miles of road per square mile of land area, affects many other refuge resources. For example, roads and their associated drainage systems alter water flow. This can result in increased stream sediment which may adversely impact riparian and aquatic habitats (Knutson and Naef 1997). For this reason, the density of roads within the refuge, both those directly managed by the FWS and those on private inholdings, can have a significant impact on refuge resources. Map 11 displays the average open road densities found within the offical Refuge Boundary, by Subwatershed.

Road density was analyzed on the basis of the major subwatersheds found on the refuge. There are several advantages to using this method of analysis. A road density value calculated across the entire refuge may be skewed due to a greater number of road miles in a small concentrated area, outweighing the low road density in another portion of the refuge. Hydrologic units also provide a more realistic basis for analyzing the effects of a road system on stream and riparian habitats, and also better fits the natural pattern of wildlife movements.

Table 2-8 contains an analysis of the current road density within the approved administrative boundary of the refuge including private and Washington DNR lands (All Owners) as well as those lands administered by the U.S. Fish and Wildlife Service (FWS). For this analysis only, roads classified as State Highways were not analyzed, because the only such road, Highway 20, does not traverse the refuge.

Roads also have a direct influence on wildlife both because they remove habitat in proportion to the area they occupy (Perry and Overly 1977), and because roads provide human access to areas. This can result in increased disturbance and potential poaching of wildlife. Some wildlife, such as wintering deer, are negatively affected by the increased stress resulting from disturbance during this critical periods (Knutson and Naef 1997). Several species avoid roads and roadside areas, thereby reducing available habitat. This impact, depending on the type of road, its location and level of use, can negative influence use of adjoining habitat up to 0.5 mile away (Thomas 1979). Finally, roads act as a barrier to the movement of some animals (e.g. small mammals, amphibians, black bear) because of their sensitivity to disturbed areas, limited mobility, or because of an increased susceptibility to predation, road kill, or poaching while crossing open roads (Knutson and Naef 1997).

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Map 11. Open Road Density by Subwatersheds

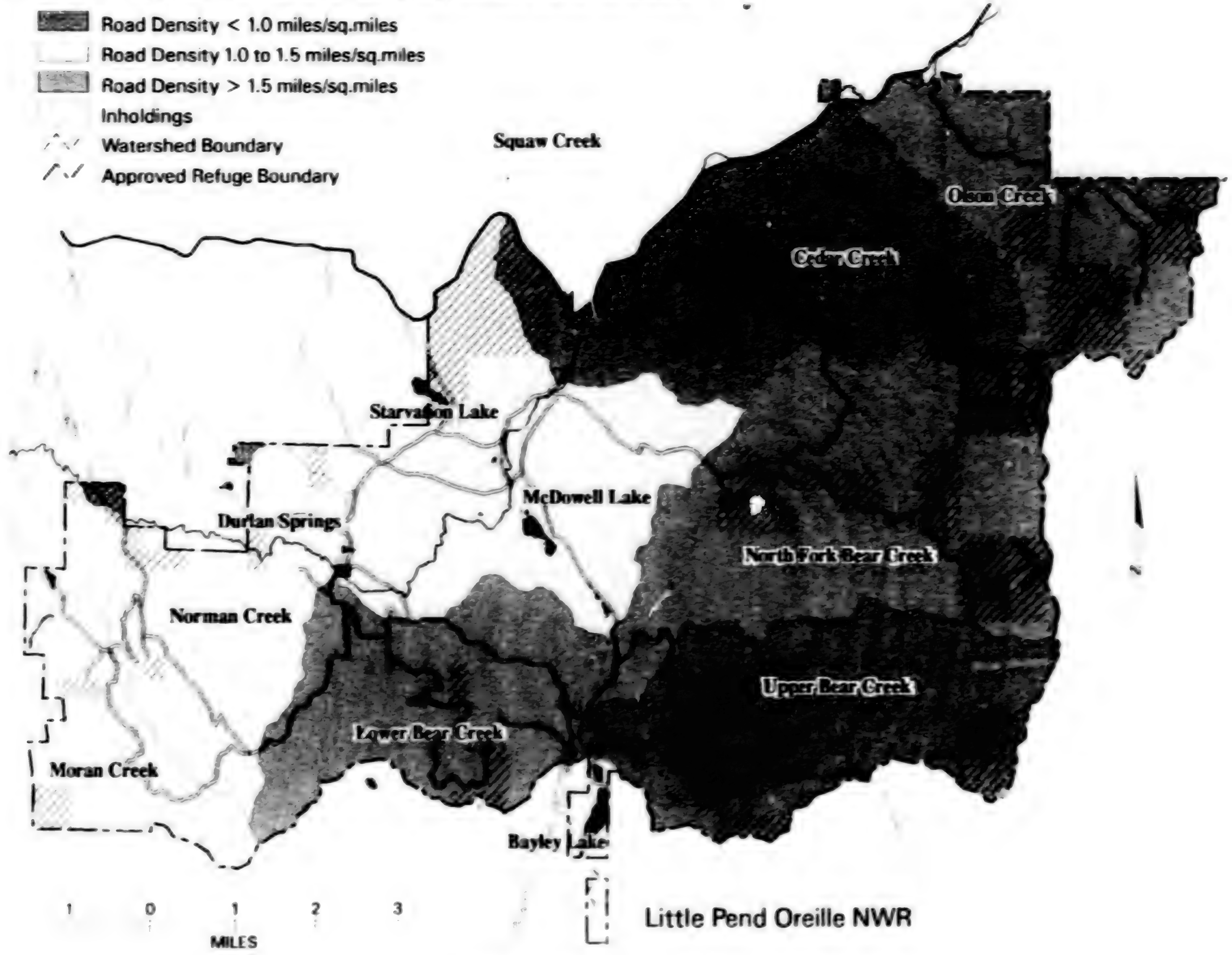

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Table 2-9. Current mileage and density of all roads by subwatershed on the Little Pend Oreille National Wildlife Refuge.

Subwatershed	Area FWS (mi^2)	Roads FWS (mi)	Road Density (mi/mi^2)	Area All Owners (mi^2)	Roads All Owners (mi)	Road Density (mi/mi^2)
Norman Creek	6.2	8.7	1.4	7.2	10.8	1.5
Durlan Springs	1.1	2.6	2.4	1.2	2.6	2.2
Starvation Lake	3.9	11.5	2.9	5.5	15.5	2.8
McDowell Lake	6.2	13.5	2.2	6.1	13.5	2.2
Squaw Creek	0.3	1.4	4.7	0.9	4.0	4.4
Cedar Creek	8.6	9.3	1.1	11.0	20.2	1.8
Olson Creek	4.2	11.1	2.6	6.3	20.4	3.2
Lower Bear Cr.	7.9	28.8	3.6	8.3	30.5	3.7
Upper Bear Cr.	7.8	15.0	1.9	10.2	29.2	2.9
N. Fk. Bear Cr.	10.7	15.7	1.5	14.4	39.6	2.7
Moran Creek	3.9	10.0	2.6	4.2	11.3	2.7
Bayley Lake	0.5	0.6	1.2	0.5	0.6	1.2

While roads impact big game habitat quality all year around, this effect is most acute on big game winter range. The whole refuge should be considered summer range for big game. However, several of the subwatersheds, primarily those below approximately 3000 feet elevation, also provide important white-tailed deer winter range. The following tables illustrate the current open road density on both summer and winter range by subwatershed. For the purposes of this analysis, all Management Access Roads were considered effectively closed to vehicular traffic.

Table 2-10. Current open road density by subwatershed on LPO NWR white-tailed deer winter range.

[illegible]	Area FWS (SqMi)	Road FWS (Mi)	Road Density (Mi/SqMi)	Area All Owners (SqMi)	Road All Owners (Mi)	Road Density (Mi/SqMi)
Norman Creek	6.0	6.9	1.1	6.5	7.7	1.2
Durlan Springs	1.1	1.7	1.5	1.2	1.7	1.4
Starvation Lake	3.9	7.4	1.9	5.5	7.8	1.4
McDowell Lake	6.2	6.3	1.0	6.2	6.3	1.0
Squaw Creek	0.3	0.5	2.1	0.9	0.5	0.6
Lower Bear Cr.	7.9	14.8	1.9	8.3	14.9	1.8
Moran Creek	3.9	4.2	1.1	4.2	4.2	1.0

Table 2-11. Current open road density by subwatershed on LPO NWR white-tailed deer summer range.

[illegible]	Area FWS (SqMi)	Road FWS (Mi)	Road Density (Mi/SqMi)	Area All Owners (SqMi)	Road All Owners (Mi)	Road Density (Mi/SqMi)
Cedar Creek	8.6	0.8	0.1	11.0	3.4	0.3
Olson Creek	4.3	6.8	1.6	6.3	10.2	1.6
Upper Bear Cr.	7.8	6.5	0.8	10.2	9.0	0.9
N. Fk .Bear Cr.	10.7	7.7	0.7	14.4	23.8	1.7
Bayley Lake	0.5	0.6	1.3	0.5	0.6	1.3

These open road densities on summer and winter ranges are useful on evaluating the current value of habitat for big game and other wildlife as well as indicate areas of the refuge that would benefit from a reduction in the amount of open roads available to public vehicular use. The Washington Department of Fish and Wildlife recommends that open road density on elk summer range not exceed 1.5 mi/mi^2. Since they do not specify an open road density on white-tailed deer summer range, the refuge will adopt the elk summer range recommendation throughout the refuge. The Department does recommend that road densities not exceed 0.5 mi/mi^2 on white-tailed deer winter range(Knutson and Naef 1997). This standard will be applied to the entire refuge in winter to reduce disturbance to not only to white-tailed deer but to other wildlife that may be susceptible to vehicular disturbance.

Recreation Program and Activities

Between October 1, 1996 and September 30, 1997, Refuge visitation was estimated at 20,000 visitor use days. The size of the Refuge, number of entrance points, and diverse activities make estimating visitor use difficult. The severe winter weather restricted access during 1997, as trees blocked many roads, possibly causing an underestimation of visitor use days. The two most popular recreational activities are fishing and hunting. Fishing and hunting plans were written for the Little Pend Oreille National Wildlife Refuge in 1989. Map 12 illustrates the main recreational activities on the Little Pend Oreille Refuge.

Fishing

Currently, fishing in Potter's Pond, McDowell Lake, and Bayley Lake begins on the last Saturday in April and continues through October. All Federal and State fishing regulations, seasons, creel limits, and license requirements apply.

Potter's Pond attracts bait anglers and is frequented by families and seniors. The Refuge built a wheelchair accessible fishing dock in 1996 that provides a popular spot for anglers of all abilities. Statewide rules and creel limits allowed a catch of five trout in 1998. Potter's Pond is stocked by the State with catchable size rainbow trout. While it is a small lake, it is a very productive, growing large fish fish. Bank fishing is the most popular method of fishing on Potter's Pond but small boats are also used. A stream closed to all fishing connects Potter's Pond to Bayley Lake.

Bayley Lake is managed as a quality fishery, allowing only fly fishing with barbless hooks and no motorized boats. A one-fish limit (14" minimum) is allowed from opening day through July 4. Between July 5 and the end of the season, fishing in Bayley is catch and release only. Bayley is one of the most popular lakes with fly-fishing anglers. One author described Bayley as the most productive lake in the state as it can grow fish up to seven pounds. Bayley Lake has many devotees in the Spokane-area fly-fishing community.

Bayley Lake is stocked annually by the Washington Department of Fish and Wildlife with catchable size trout; usually rainbow trout with occasional brook trout stockings. The connecting stream between Potter's Pond and Bayley Lake has been modified to enhance spawning habitat, with limited brook and rainbow trout spawning occurring.

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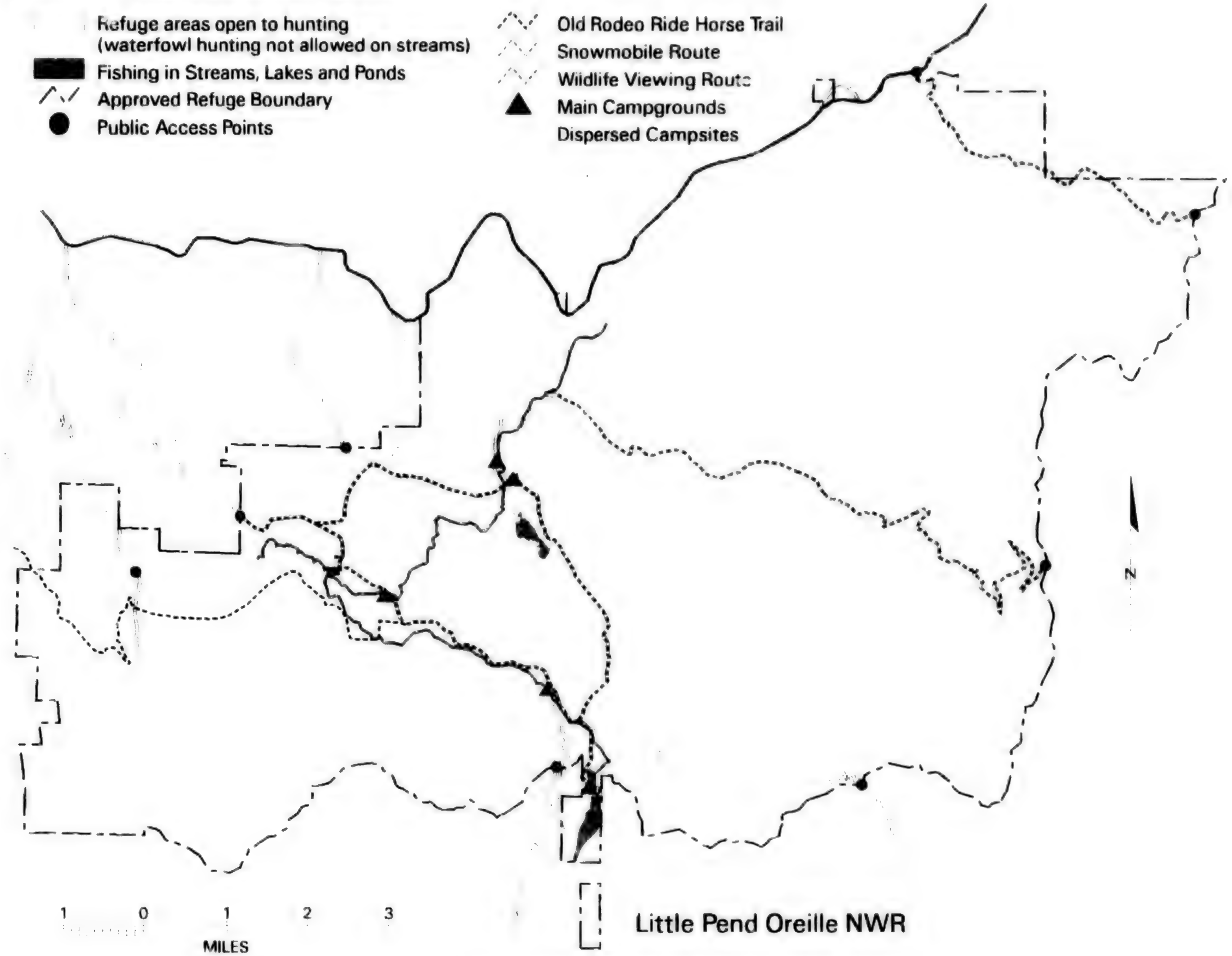
Map 12. Recreational Uses



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Ron Reitel, 13 April 1999, [illegible]

McDowell Lake is managed as a catch and release fly-fishing only lake and is popular with many of the same anglers who fish Bayley Lake. This lake is also typically stocked by the State. Use of motors is prohibited and access to the lake is either through a 1/3 mile trail or down a steep bank. Most McDowell Lake and Bayley Lake anglers use belly boats or catarafts, with some canoes and rowboats.

The Little Pend Oreille River, other Refuge streams, and beaver ponds are open to fishing from June 1 through October 31. Statewide rules apply in all Refuge streams. Many anglers fly fish along the Little Pend Oreille and may catch rainbow, cutthroat, brook, or brown trout. Fishing near Cottonwood, Little Pend Oreille River, and Horse Camps is popular with Refuge campers

Peak lake fishing periods are from opening weekend through the early part of June. All Refuge lakes are fairly shallow and fish get sluggish during warmer weather. The small size of Refuge lakes - between 15 and 75 acres - limits the numbers of anglers in any given period. Depending on the year, there is often another smaller peak use period from late September through October when lake water cools and fish are more active. River fishing activity is distributed throughout the open season The Refuge provided an estimated 3,500 fishing use-days during 1997.

Hunting

Several species of big game, small game, predators, and migratory waterfowl are hunted on the Refuge. All Federal and State hunting regulations, seasons, bag limits, and license requirements apply, with certain minor additional restrictions. The Refuge is closed to all hunting, pursuit, and use of firearms from January 1 through August 31. Northern portions of the Refuge open for hunting on September 1, while southern portions open on October 1. Both portions close to hunting on December 31. These closures protect the Air Force Survival School participants during their training. There are no-shooting zones within 1/4 mile of Refuge headquarters and established campgrounds. Hunting of ducks and geese is prohibited along Refuge streams.

Northeastern Washington is known for its white-tailed deer hunting and the Refuge is a popular deer hunting destination. There are hunting seasons for muzzle loaders, archery, and modern firearms, which when combined with special permits and seasons provide numerous white-tailed deer hunting opportunities on the Refuge from September 1 through September 30 andOctober 17 through December 15. Antlerless and other special permits are also available.

The peak periods for white-tailed deer hunting on the Refuge are the last 10 days of the modern firearm season. As many as 100 hunting camps may be occupied on the Refuge at this time, with other visiting hunters staying in area motels. Following the high winter mortality of 1996 and 1997, estimated by Washington Department of Fish and Wildlife biologists at approximately 40%, the 1997 white-tailed deer hunting seasons offered mixed results. Even with a forecast of below average deer numbers, the Refuge was host to many hunters from central and western Washington who were visiting the Refuge for the first time.

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Starting in 1997, Refuge personnel collected antler size data and incisor teeth from as many deer harvested on the Refuge as possible. Due to the low population of deer in 1997 throughout northeastern Washington, a sample of only 18 deer was collected on the Refuge. Thirteen of those deer were bucks, with an average age determined by dental cementum analysis of 3 ½ years. The 5 females sampled averaged 5 ½ years old. Age for all deer sampled ranged from ½ to 8 ½ years of age.

Forest grouse hunting is very popular on the Refuge. Beginning in 1997, hunters were asked to deposit one wing from each harvested grouse into "wing" barrels placed at each Refuge entrance. Sixty-nine wings were deposited during the 1997 grouse season, with 62 being ruffed grouse, 6 blue grouse, and one spruce grouse.

The Refuge supports a healthy population of wild turkeys. The Washington Department of Fish and Wildlife conducts a spring wild turkey season in this part of the state; however, turkey hunting is currently not available on the Refuge due the firearms closure associated with the Air Force survival school training program. Washington Department of Fish and Wildlife biologists feel the Refuge flock could support a spring hunting season (Zender pers. comm.).

Hunting pressure for elk, moose, and mule deer is relatively light due to the low numbers of these species currently inhabiting the Refuge. A few hunters pursue black bears, however the majority the bears and mountain lions harvested on the Refuge are taken incidentally by hunters pursuing white-tailed deer. Some coyote and bobcat hunting occurs, mostly after the deer season, when snow cover makes predator calling more productive.

The Little Pend Oreille Refuge provided 6,100 hunting use days during 1997, with 5,000 use days for big game hunting. Special permits are required for commercial guiding of hunters on the Refuge and to date, only one request for a permit has been made. Currently there are no permitted guides or outfitters operating on the Refuge.

Wildlife Viewing

There is a growing interest in wildlife viewing on the Refuge. This may be due to an increasing trend in wildlife viewing nationally as well as the result of highway signs guiding visitors to the Refuge. The Refuge is described in the Washington Wildlife Viewing Guide and several state birding guides. Some interest is generated through the national wildlife Refuge web site. Many birders contact the Refuge office for information about species and where to bird watch. The number of people who visit the Refuge to view wildlife is unknown but many users who visit primarily for other reasons (camping, fishing etc.) also enjoy seeing wildlife.

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Camping

With the exception of the early spring fishing season and the fall deer hunting season, most Refuge camping is not directly associated with other Refuge uses such as hunting, fishing, wildlife observation or photography. Peak holiday weekends include Memorial Day, Independence Day and Labor Day. Camping has a long history on the area with at least three of the five campgrounds pre-dating the official establishment of the Refuge. River Camp and Cottonwood Camp were logging camps, known as Camp #1 and Camp # 2, respectively. Horse Camp was originally used during the logging era by teamsters for their draft horses. Bear Creek Camp and Potter's Pond/Bayley Lake Camps are user developed sites also popular with Refuge campers. Camps are primitive, with pit toilets and some fire rings. There is a seven-day camping limit on the Refuge. Besides these designated camps, there are many dispersed camps sites that have a tradition of use.

During the 1997 deer hunting seasons, there were 47 dispersed camps on the Refuge. There are at least 10 more dispersed sites used intermittently throughout the year. The unrestricted nature of camping on the Refuge creates several management problems. Some dispersed camps are in riparian areas and in or near other important fish and wildlife habitats. Refuge users are gradually expanding two Refuge campgrounds. Camping with horses is growing in popularity and creating camps conditions undesirable to other Refuge users. Campers are damaging many live trees. Since camping within the Refuge is free, it is a popular camping destination during busy, holiday weekends. While many Refuge campers also enjoy fishing and wildlife viewing, some Refuge visitors use the campgrounds as sites for family gatherings and drinking "parties". Also, some homeless campers try to "move in" to these campgrounds for extended periods of time. There is a clear need to manage Refuge camping.

Horseback riding

The first Washington Department of Game manager created and maintained several miles of horseback riding trails within the Refuge. There are several organized back country horsemen's groups in the area as well as many local riders not affiliated with organized groups who ride within the Refuge regularly. These riders continue to maintain some of these trails, but also ride cross-country in flat, low-elevation areas. There has been a traditional ride within the Refuge associated with the Arden Old Timers Rodeo in mid-May with approximately 135 riders as well as several smaller organized group rides.

Riders use lower elevation areas beginning in April and continue to ride until snowfall. The peak use is in May and June when higher country trails are still snowed in. While most riders are conscientious, some cut fences, ride cross-country when the ground is too wet, and do not clean up after their horses at trail heads and in Refuge campgrounds. The unrestricted nature of this horse use has created some problems that the backcountry horse users are interested in helping to solve through education.

Within the last year, two parties have inquired about providing day-rides and overnight rides within the Refuge. These requests will be considered during development of the public use plan for the Refuge.

Snowmobiling

Refuge snowmobile use expanded during state management, with an estimated 50 miles of roads open to snowmobile use in 1974, and establishment of a Sno-Park parking area on Refuge land on Olson Creek Road adjacent to Highway 20. Currently, approximately 15 miles of Refuge roads are open to snowmobile use. The main use area is the Olson Creek Road which provides access to Calispell Peak, a popular snowmobile destination. A portion of Blacktail Mountain Road east of the Blacktail bridge is also open to snowmobiles. Snowmobile use is restricted along Blacktail Mountain Road west of that bridge to protect wintering deer.

Until recently, monitoring snowmobile use has been difficult as the Refuge did not have access to a snowmobile. During the winter of 1996/97, there was considerable snowmobile use along Olson Creek Road from December through March. Stevens County grooms this trail through a Refuge special-use permit and plows the parking lot. Snowmobiling is not dependent on wildlife and may be disturbing to some species under certain conditions.

Other recreation

There is a demand for several other recreational activities on the Refuge including trapping, mountain bike riding, cross country skiing, dog sledding, search and rescue training, hiking, jogging, and scouting. These and other similar uses need to be evaluated to determine their impacts and compatibility with the Refuge's priority uses.

Recreational trapping requires a special use permit and has been limited to one permit during the past four years. Refuge records show only a few trappers setting traps on the Refuge in the last 20 years. Muskrat, beaver, mink, coyote, and bobcat were some of the species trapped during previous years. The future of trapping will depend on evolving national Refuge policy and the population status of trapped animals. Trapping has potential as a future population management tool in certain situations.

Mountain bikes may be used on maintained roads only. This is a use that is still minor but may be growing in popularity. Peak months for this activity are June through September. Estimated use days for this activity is 700.

Cross-country skiing and snowshoeing uses are dependent on the quality and quantity of Refuge snows. Since snowmobilers use the higher country, their use limits skier and snowshoe use since these activities conflict. Most skiing and snowshoeing occurs on the deer winter range, which may present problems if this use grows. Estimated skiing and snowshoe use days average less than 500 days.

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Within the last two years, dog sledders have discovered the Refuge. Refuge restrictions on snowmobiling make it attractive since dogs and snowmobiles are not compatible. An area dog sledder who wanted to use a snowmobile to groom runs for sledding requested a special use permit. While this use is relatively minor, new dog sledding clubs are forming in and around Spokane. One Refuge neighbor has a dog team and uses the Refuge year-round to train sled dogs.

Scouts and two search and rescue groups are active on the Refuge. These groups combined yield an estimated 500 use days.

There are illegal uses that Refuge staff try to prevent. Having only a part-time law enforcement officer restricts effectiveness in eliminating illegal uses. Illegal uses, besides fishing and hunting violations, include off-road vehicle use, illegal firewood cutting, and underage drinking parties. Vehicles operating on Refuge roads must be "street legal" and have mufflers, license plates, registration, and be in proper operating condition. Vehicles must remain on established roads. Special use permits are require for any group of more than 25 people or 15 horses.

2.5 OTHER REFUGE USES

Air Force Training Activities

For the past 33 years, the Air Force Survival School has used the Refuge and adjacent national forest lands for survival and evasion training. The training occurs from January through September, with concentrated use, including helicopter use, in the late summer. During the training season, an average of 90 Air Force personnel may be on the Refuge at any given time. For example, in 1995, 779 Air Force personnel used the Refuge for a total of 81 days. No public hunting or firearms discharge is allowed on any part of the Refuge from January through August, with this ban continuing through September on the southern portion of the area. This hunting closure was secured through the Washington Department of Fish and Wildlife to accommodate the Air Force use.

Air Force trainees are dispersed throughout the central portion of the Refuge. The resources they use include trees for shelter, bedding and firewood, and wildlife such as small mammals, mussels, fish, snakes, grouse, and deer when they are learning food procurement techniques. Base camps are established to support the program and helicopters are used extensively at times during rescue training. Map 13 illustrates the areas of concentrated U.S. Air Force use.

There are a number of concerns or impacts resulting from this training. The severity of the impacts depends on the extent of the training and the number of individuals involved. The potential impacts from Air Force Survival training include:

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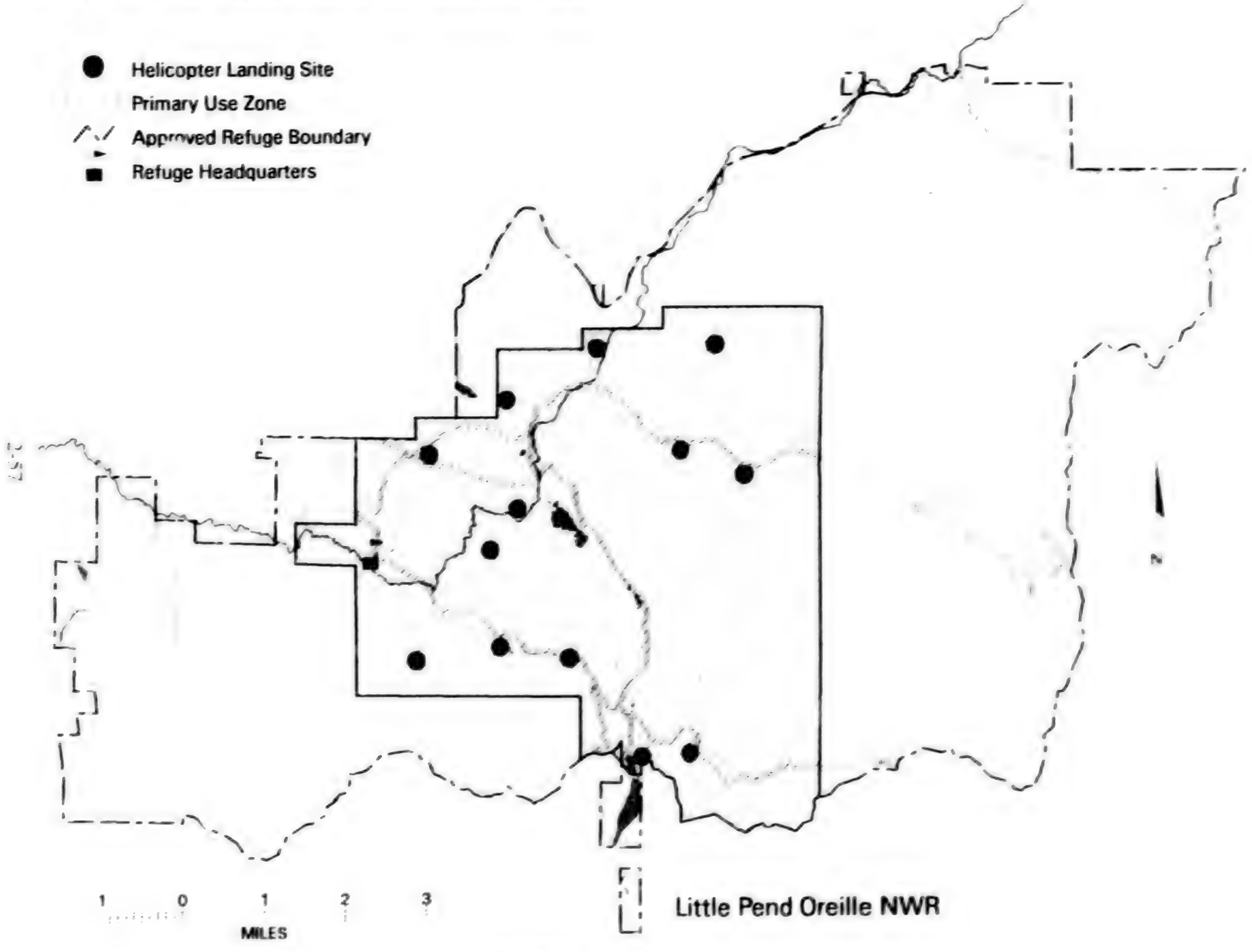
Map 13. Air Force Survival School Use



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- effects on visitor experience, such as when visitors are subjected to loud overflights and possible frequent contact with military personnel during peak training times;

- effects on visitor experience, such as when visitors are subjected to loud overflights and possible frequent contact with military personnel during peak training times:

- effects to habitat from base camps, fires, and repeated use in the same areas by large groups; and

- restrictions on hunting opportunities for turkeys, forest grouse, bear, and other species through the special hunting closure.

Livestock Grazing

Livestock have been grazed on the area that would eventually become the Little Pend Oreille NWR since before the area was officially homesteaded beginning around the turn of the century. Most homesteaders cared for at least some livestock, including cattle , horses, mules, sheep, goats and pigs. When the Refuge was being established in the late 1930's, many local cattlemen voiced concerns about the new Refuge lands continuing to be available for livestock grazing.

A livestock grazing program of some type has been managed to some degree on the Refuge since its establishment. When the Washington Department of Game assumed management in 1965, they continued to administer a grazing program. That program was maintained after the U.S. Fish and Wildlife Service resumed management of the area and continues to today.

In 1978, the Little Pend Oreille Wildlife and Recreation Area (as it was then called) entered into a Coordinated Resources Management Plan (CRMP) process with the Soil Conservation Service (now the Natural Resources Conservation Service). An initial inventory of resources was begun in 1981, and completed in 1983. The goal of this inventory was to provide an up-to-date forage resource evaluation for the area manager to base forage management decisions. In 1985, a Coordinated Resource Management Plan was adopted that determined the maximum number of animal unit months (AUMs) for each grazing unit as they existed then based on the forage type available and the accessibility of the unit to livestock. It should be noted that inventoried AUMs represent the estimated total amount of forage available for all herbivores, both domestic livestock and wildlife. Stocking livestock at these inventory levels would not leave any forage for other animals.

This original plan was slightly modified in 1990, to reflect the reorganization of some of the grazing units. The following table illustrates the available AUMs as inventoried in 1985 and the leased number of AUMs allocated to the 4 permittees.

From 1990 until 1996, the AUMs made available to or utilized by permittees gradually decreased until approximately 750 - 800 AUMs were allotted to grazing permittees on the Refuge during a grazing season running from June 1 through September 30. These herds were mostly cow/calf pairs, with some bulls. Pastures included both upland coniferous forest and large portions of the alluvial riparian flood plain along both Bear Creek and the Little Pend Oreille River. Several horses were allowed to graze in portions of the Little Pend Oreille River riparian zone from about October through May from 1983 through 1994. In 1997, the number of AUMs allotted on the Refuge was reduced to 350 AUMS when one permittee sold most of their herd. According to the grazing plan, cattle are to be removed from units when the stubble height of grass is reduced to 6 inches. This treatment was selected because theoretically, such relatively light grazing should not result in cattle browsing on shrubs that provide important forage for wintering deer.

For the purposes of discussing grazing systems on the Refuge, the landscape can be divided into two broad but distinct habitat types; alluvial riparian valleys and the forested uplands.

About 6 miles of Bear Creek and about 2 miles of the Little Pend Oreille River occurring on the Refuge are low gradient streams flowing through relatively broad alluvial valleys formed from the material deposited by the streams. Seven grazing units include portions of each of these valleys, totaling about 338 acres of alluvial valley that are now grazed or have been grazed units 1996. These valleys have been radically modified by logging, farming, grazing, and fire suppression. Presently Kentucky bluegrass and reed canary grass are the most conspicuous grass species. Alder is the dominant woody species along the edges of the streams. Most stands of alder appears to be even age with little regeneration observed. Willow species are scarce. There are some scattered mature cottonwoods and aspen, but very little sprouting is evident. Although these alluvial riparian pastures only constitute <1% of the Refuge's total land base, they provide the highest quality forage available to livestock and therefore are used by cattle far out of proportion to their availability.

With the exception of the Starvation Flat area, the remainder of the upland portion of the Refuge is divided into grazing units. However, due to a lack of forage, steep terrain and other factors, livestock tend to concentrate on the lower elevation areas. "Trespass" grazing currently occurs on majority of the private inholdings owned by Boise Cascade and Stimson Lumber Company since very few fences excluding cattle from these areas have been built. In contrast to the alluvial riparian pastures, upland allotments are very large with most encompassing at least several square miles. Grazed forested areas range in elevation from 2,000 to 5,200 feet with the predominant tree species being ponderosa pine, Douglas-fir, larch, lodge pole pine, western red cedar and western hemlock. Most of the upland grazing occurs in overstocked ponderosa pine and Douglas-fir stands with suppressed understory vegetation. Aspen inclusions and deciduous

Table 2-12. Little Pend Oreille NWR grazing units based on 1985 summary of unit size and inventoried AUMs. Leased AUMs based on 1990 WDFW grazing plan adjustments based on 1985 CRMP.

Grazing Unit	Approx. Acres	Inventoried. AUMs	Leased AUMS	Grazing History
1	440	88	50	Rotational grazing[1]
2	5,060	1,170	0	Not grazed
3	587	101	0	Not grazed
4	28	9	5	Combined with 5 and 6. Rotational grazing.[2]
5	97	37	21	"
6	1,477	219	123	"
7w	2,914	87	49	Rotational grazing.
7e	5,828	99	0	Not grazed.
8	8,742	186	105	Rotational grazing.
9a	32	19	11	Rotational grazing.
9b	5,226	178	100	Mixed ownership with Boise Cascade. Rotational grazing.
10	1,720	112	52	Mixed ownership with Boise Cascade. Rotational grazing
11e	173	87	41	Rotational grazing.
11w	172	169	79	Rotational grazing.
12	50	35	17	Rotational grazing
13 a	173	70	39	Rotational grazing.
13b,c,e	206	293	0	Not grazed
13d	33	15	8	Rotational grazing.
14e	33	22	19	Rotational grazing.
14w	1,460	55	48	Rotational grazing.
15e	680	15	8	Rotational grazing.
15w	4,480	145	126	Rotational grazing.
16e	240	75	65	Rotational grazing.
16w	1,440	102	89	Rotational grazing.
16s	280	20	17	Rotational grazing.
Approx. Total	41,571	3431	1072	

[1] Refers to grazing a unit only part of the grazing season, then rotating livestock to another grazing unit

[2] Previously separate units, fences separating units 4, 5 and 6 were removed by 1990.

browse such as evergreen ceanothus, serviceberry, and snowberry are generally depressed. Most existing browse is decadent and often over-browsed. The existing densely treed forest appears to be a consequence of fire suppression, selective logging, and livestock grazing.

In addition to the Little Pend Oreille River, these upland areas are dissected by numerous other small perennial streams. Due to their gradient, the riparian zone associated with them is quite narrow. Unlike the lower elevation, low gradient alluvial riparian areas, livestock impacts to these riparian zones does not appear to be significantly greater than that observed on the surrounding upland areas.

Obviously, the presence of livestock has a considerable affect on wildlife and their habitat. Livestock can compete with wildlife for a common food source, displace wildlife through their presence, as well as alter the structure of habitat, making it less desirable or functional for wildlife. The following are areas where livestock can have a potentially negative affect on Refuge wildlife populations:

- Livestock grazing may have significant, positive impact on either forage quantity or quality for white-tailed deer and other wildlife. However, while theory concerning this effect abounds, little definitive information exists. Livestock grazing is probably beneficial to deer in some circumstances, but intentional manipulation of livestock to enhance deer range is another matter (Connolly and Wallmo 1981 *in* Teer 1996).

- There is a potential for competition for food between livestock and big game. The dietary overlap between cattle and white-tailed deer is generally limited since cattle diets are composed primarily of grasses which deer use sparingly (Teer 1996). However, by about mid-summer, grass forage becomes scarcer and cattle begin to switch their diet to increasing amounts of browse. This brings them into direct competition with both white-tailed and mule deer, and to lesser extent with elk.

- Browsing by cattle may have negative impacts on other species of wildlife also. Saab et al. (1995) found no studies that specifically evaluated the influence of livestock grazing on neotropical migrants using coniferous forests in the western United States. However, they speculated that birds most likely to be negatively effected by livestock grazing included those species dependant on herbaceous and shrubby ground cover for nesting and/or foraging. They felt that the reduction in suitable nesting and foraging habitats for ground nesting birds was a likely form of livestock- induced negative impact to migratory land birds within western coniferous forests.

- Ruffed grouse on this part of their range depend very heavily on the flower buds of mature aspens for winter food. These aspen inclusions are also valuable habitat for deer, woodpeckers, and many songbirds. Aspen groves on the Refuge show a very low rate of reproduction. Almost all of the suckers present have been browsed heavily. While this may be the result of wildlife and domestic livestock browsing as well as other influences, there is little doubt cattle are contributing to the suppression of these stands.

- Researchers have detected a significant reduction in small mammal populations in grazed areas when compared to ungrazed. (Fagerstone and Ramey 1996). This is thought to be tied to a loss of cover from cattle foraging resulting in higher predation rates and emigration from grazed areas to ungrazed. In either case, the carrying capacity of the area for small mammals was reduced, which in turn reduces the amount of prey base available to predators such as coyotes, great-horned owls, and red-tailed hawks, thereby reducing the areas carrying capacity for these carnivores.

- Maintaining a grazing program on the Refuge has required the construction and maintenance of between 65-70 miles of fences, most within the alluvial river bottoms. Many of these fences are in poor condition and not designed for deer passage. This, coupled with the fact that most occur in white-tailed deer winter range, increases their negative impact on deer.

- Brown-headed cowbirds associated with cattle may be negatively impacting native bird populations. Brown-headed cowbirds are nest parasites that do not build there own nest but instead lay their eggs in the nest of other passerine birds. Both brown-headed cowbirds and warbling vireos, as well as other potential host species, are found in the Little Pend Oreille NWR. However, early research has shown that brown-headed cowbirds will not travel more than 2 miles from agricultural areas and their cattle herds. Removing cattle from the Little Pend Oreille could reduce this parasitism problem on the Refuge.

2.6 ADMINISTRATIVE FACILITIES

The Little Pend Oreille NWR maintains three administrative sites within the Refuge. The main headquarters compound is located on Bear Creek Road. This complex contains the Refuge office, one government quarters residence, a maintenance garage and vehicle storage shed, a storage barn, and a fuels storage building. Winslow Cabin is an administrative site located off Blacktail Mountain Road. The Refuge also maintains a third administrative site along Bear Creek. Called the "green house," this small cabin was formerly used by the Air Force as a command post during training exercises. It is currently unused.

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2.7 CULTURAL RESOURCES

Prehistoric and Historic Use

Use of the area within the boundaries of the Little Pend Oreille NWR by Native American Indians is not well documented. In fact, no prehistoric sites have been located within the Refuge itself. This may seem unusual because of the dense population centers located on the Columbia and Pend Oreille Rivers. Evidence from ethnographic and archaeological sources suggest that native groups congregated along the major rivers to harvest salmon and trade.

Based on information gathered in the nineteenth century, the Kalispel Indians lived along the eastern boundaries of the Pend Oreille range, around Lake Pend Oreille, Calispel Lake, and along the Pend Oreille River. A population center for the Kalispel was also in the Chewelah area, south of the Refuge. The Colville Indians inhabited the area from Kettle Falls on the Columbia River, south to the Colville Valley, but did not penetrate the mountainous region east of Colville (Ray 1936). The Spokane Indians were centered around the falls at Spokane.

Fur traders noticed the abundant fur bearing resources of northeastern Washington in the 1820s. David Thompson built Spokane House and the Hudson's Bay Company established Fort Colville, in 1825, to attract the steady trade of the Natives. Fort Colville was located approximately 25 miles west of the Refuge. A trail from this fort connected the Pend Oreille River valley with the Colville River valley. The trail was along the Little Pend Oreille River that borders the Refuge. A path used by the Kalispel, "reportedly traversed the Tacoma Creek and Olson Creek drainages" (Ellis and Lindeman 1982:35).

Settlement along the Columbia and Colville Rivers began in the 1850s. The influx of settlers required the U. S. Army to establish a new Fort Colville in 1859, and it became the hub of a community that by 1880 was re-named Colville.

By the late-1870s and early 1880s, people were beginning to move into the interior valleys, searching for property to homestead, ahead of the General Land Office surveyors. These squatters, cleared land, built cabins, and established roads and trails through the thickly forested terrain of the Little Pend Oreille River valley. A homesteading boom ensued at the turn of the century, 83 claims were patented between 1901 and 1910. By 1930, more than 180 claims had been patented within the boundaries of the Refuge (Bureau Of Land Management Records).

Settlement by homesteaders led to a second economic boom in the area-- logging. In some instances, the "homesteaders" may have been actually working for the lumber companies, staking claims, then turning over the land to the logging company. For other settlers, selling the timber off of the claim provided much need cash and cleared space for orchards, gardens, and pasture.

Rail lines established into northeastern Washington in the 1890s created a ready market for timber. The Winslow Logging Company built a standard gauge spur line from their mill in Orin up the Little Pend Oreille River. The Winslow company built many miles of track, established several camps, and logged the ponderosa pine stands until a fire in 1938 destroyed their mill and business. The railroad line required several engineering feats to overcome rugged terrain and steep river canyons. The Winslow Bridge, a 125 ft suspension bridge, was move from Spokane in 1917, to provide a sturdy crossing for a deep chasm on the Little Pend Oreille River. Although now collapsed, the bridge is unique in its design and is listed on the National Register of Historic Places. Other bridges or trestles constructed by Winslow Logging Company are more typically log crib design. Remnants of the log crib trestles are still found on the Refuge.

When the Depression of the 1930s hit the Colville area, many homesteaders gave up and moved from the area. The land was fertile, but the seasons were too short and the winters too harsh to maintain productive gardens. In the mid-1930s the Federal Government began a program to purchase tracts from homesteaders who were located in "submarginal lands." The program purchased land claims outright or traded parcels for land in a more productive area. After the land returned to Federal ownership it was divided among the federal agencies now known as the Forest Service, Bureau of Land Management, and Fish and Wildlife Service. The Little Pend Oreille National Wildlife Refuge was established in 1939 by Executive Order.

Cultural resources identified on the Refuge are related to the historical developments. With more than 180 individual homesteads patented, the cleared fields, cabin remnants, orchard trees, and place names such as Pierce Lake, Lenhart Meadows, and McDowell Lake are associated with homesteaders. Logging has also been an important activity within the Refuge boundary. The Winslow Logging Company railroad line, bridges, and camps are reminders of this short-lived boom period in the Little Pend Oreille forest.

Status of Cultural Resource Inventories

Beginning in 1982, cultural resources surveys have been conducted on the Refuge in order to fulfill the requirements of the National Historic Preservation Act (NHPA). Approximately 3,100 acres, or less than 10 percent of the entire 40,000 acre Refuge have been surveyed. The surveys have been conducted for timber sales, a land exchange, Potter's pond, and a stratified sample to gather information for the Comprehensive Conservation Plan. Several special studies have also been conducted including a historic bridge survey and a mine contamination study.

Additional surveys are required when new projects are sponsored by the Refuge such as road construction, prescribed fire, timber harvest or thinning, facilities remodeling, new construction, and any other activity that has the potential to affect historic properties. For instance, the management of the open homestead meadows and orchards will require coordination with the NHPA, because the meadows are the remnant landscape features of an important historical event in the Little Pend Oreille area, homesteading.

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Presented in Table 2-13 are the sites inventoried to date, the name of the project and report reference, a brief description of the resource, and its level of significance based on the National Register of Historic Places criteria.

Table 2-13. Cultural Resources Recorded on the Little Pend Oreille NWR.

Site Number	Project/Author	Cultural Resource Type	National Register of Historic Places
LPO-513	Addy Mtn. T.S. (McComb:1984)	Features associated Y.P. Bouma homestead.	Not eligible
LPO-PS #1	" "	Roadside dump, recent.	Not determined
LPO-514	" "	A.E. Baughman Homestead, 1901-1920	Not eligible
A-2	Eastern Wash. Survey (Morgan 1991)	Can dump, 200+, hole-in-top and sanitary cans	Not eligible
A-1	" "	Wooden sled --used for logging	Not eligible
	Starvation Flat TS, (Burnside: 1996)	Can dump	Not eligible
	" "	Can dump	Not eligible
RR-1	" "	Winslow RR grade	Not determined
RR-2	" "	Winslow RR grade	Not determined
1401-2 45-ST-237H	Timber Sale (J.D. Jones:1979)	Louis E. Nofs Mine, 1920s-1930s	Not determined
1	Burlington-Northern Land Exchange (Ellis & Lindeman:1982)	Alma Jacobson Homestead	Not eligible
2	" "	B.J. Carney/Louis Strauss Lumber Camp	Not eligible
3	" "	Alphonse Snook Cabin. Moved to Colville, Stevens Historical Society Museum	Not eligible
4	" "	Callaghan Barn	Not eligible
5	" "	Historic Roadside dump	Not eligible

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Site Number	Project/Author	Cultural Resource Type	National Register of Historic Places
45-ST-321H	Transportation Survey (Soderberg: 1980)	Winslow Railroad Bridge The Winslow Bridge is an example of a timber deck Howe truss bridge, moved from Spokane to site on Little Pend Oreille River in 1917 by Winslow Lumber Company.	Eligible, listed 1982, collapsed 1991.
1401-11	Bayley Lake Cabin (Osborn: 1983)	Bayley Lake Cabin, 1937-1983.	Not eligible
	Stratified Sample Survey (Speulda & Kaehler: 1997)	Varline Homestead Log Cabin	Not determined
	" "	T. Hard Homestead site/ Winslow Camp/ LPO Quarters	Not determined
	" "	Christianson Ranch	Eligible
	" "	Furst Cabin	Not eligible
	" "	Carlson Homestead Barn	Not determined
	" "	LPO Office	Not eligible

Cultural Resources Potential Conflicts

The lack of identified prehistoric archaeological sites in the Refuge area may be more the result of heavy vegetation and the limited acres actually surveyed. After all, people have been documented in the northwest for at least 10,000 years, and several very early sites are located along the Columbia River. It is likely that during the very long period of occupation along the Columbia River, people also traveled throughout the interior drainages. Travel routes usually conform to natural corridors, such as major ridges or rivers. Resources exploited by the Native Americans included upland game animals, plants, fish, birds, and lithic raw material sources. The Little Pend Oreille River Valley and the Bear Creek drainage may have been a connecting route between two high population areas and served as a secondary resource extraction area during times of crisis.

As observed by Renk and Miss (1998) "Sites on the Refuge could be expected to reflect the regional trends of increasing population using land use strategies that shift through time from forager to collector and then are modified by Euroamerican introduction of the horse and catastrophic disease. These changes are indicated in the archaeological record not only by frequency and age of sites, but by site characteristics which reflect the size, mobility, and purpose of the group which created them."

The potential for conflicts between cultural resources and the objectives implemented on the Refuge may intensify as new discoveries re-define our understanding of Native American use of the Bear Creek watershed. An obviously sensitive topic is the legacy of homesteaders on the Little Pend Oreille NWR. More than 180 homestead tracts were patented on the Refuge between 1891 and 1931. Each of these parcels are potentially archaeological sites and many still contain landscape features such as cleared meadows, orchards, fences, and even cabins. Developing a systematic method for assessing the research potential, testing the model, and retrieving information would be an important first step to interpreting this important period.

Elements of the twentieth century industrial development surrounding the Refuge includes, agriculture, logging, railroading, and mining. Only a handful of mines have been recorded on the Refuge, and none of them have been assessed for their significance to the National Register of Historic Places. Evidence of logging is primarily associated with the railroad lines, trestles, bridges, camps, and large stumps that remain on the landscape. The Winslow Logging Company was very influential in the area and the railroad line and camp may be useful for interpreting this economic activity to the public. Research, mapping the lines, and identifying logging-related features, camps, and sites should be considered for future projects.

When predicting potential conflicts and forming management decisions, it is important to understanding that there is the potential for new discoveries of Native American use, and that the homestead parcels and railroad features are important pieces of the twentieth century history of the Refuge. What follows is an abbreviated list of a few of the sources of potential conflict.

- *Recreational* use of campgrounds, trails, boat docks, river and stream-side fishing, and picnicking can effect cultural resources. Areas currently being used for Refuge sponsored recreational activities, which have not been surveyed, should be considered a high priority for completing the identification, evaluation, and protection according to the NHPA.

- *Timber harvest or commercial thinning*, along with any road improvements, log landings, skid trails, new roads, or increased access to an area, is considered an undertaking that must follow Section 106 regulations of the NHPA.

- *Timber Harvest by Private Corporations*: Inholdings that are harvested by private corporations that require a special use permit for using Refuge roads to haul logs is considered an undertaking.

- *Fire management and prescribed burns* are usually performed on large blocks of acreage. Conducting a cultural resources survey that implements a stratified sample would be an excellent method of meeting the Section 106 compliance issues for this type of undertaking, while gathering important information about cultural resources.

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- *Restoration projects* including stream side improvements, ditches, dikes, water control structures, re-vegetation, and recontouring projects require review by the Cultural Resources Team in order to define how compliance with Section 106 will be handled.

- *Air Force Training's special use permit* needs to be monitored. Training exercises that include activities such as road maintenance and construction, helicopter pads, detonating explosive devices, or other ground disturbing activities are consider undertakings. Areas that receive this intense use require a cultural resources survey prior to issuing the permit.

- *Grazing* is an issue that is difficult to ascertain whether cultural resources are affected. However, in the case of the Christianson Ranch, cattle entry into the buildings is causing harm to the structures. This situations requires immediate attention.

- *Facilities maintenance and new construction* projects should be reviewed by the Cultural Resources Team, so that compliance with Section 110 and 106 are assured and any conflicts with cultural resources identified. For example, buildings that are 50 years old need to be considered for their historic potential. Protection, maintenance, and re-use of historic buildings is strongly advocated by the NHPA.

2.8 ECONOMIC SETTING

Economic Region

More than 99% of Little Pend Oreille NWR's 40,198 acres is in central-eastern Stevens County, Washington; approximately 21 acres are in adjacent Pend Oreille County. A recent study (Reyna 1998) compiled socioeconomic data on 543 communities in the Interior Columbia Basin, including six communities in Stevens County. These communities are Chewelah, Colville, Kettle Falls, Marcus, Northport, and Springdale. This study classified communities as "isolated" if they were located at least 50 miles from the nearest city with a population exceeding 20,000, and at least 35 miles from the nearest city with a population of 9,000-20,000. Five of the six Stevens County communities analyzed in the study were classified as isolated because of their distance from cities; Springdale is associated with the Spokane metropolitan area. Two of the communities (Colville and Chewelah) are within 15 miles of the Refuge.

Industrial diversity, commuting patterns, and spending patterns are commonly used by economists to delineate economic regions. Stevens County has a relatively diverse economy, including business establishments in 43 different two-digit standard industrial classifications (U.S. Dept. Of Commerce 1998). While highly rural, Stevens County has the fifth highest concentrations of employment and income in the manufacturing sector among the state's 39 counties (McGinnis et al. 1997).

Although the number of Stevens County residents who commute to jobs in other counties (primarily in Spokane County) is increasing, a large majority of workers who reside in the county also work there. For example, income earned outside of Stevens County by county residents increased by 30% between 1987 and 1996, but such income accounted for only 17% of total earnings by Stevens County residents in 1996 (U.S. Bureau of Economic Analysis 1998). Conversely, few nonresidents commute to Stevens County. Although most Stevens County residents sometimes travel to metropolitan areas to purchase durable goods (e.g., cars and major appliances) or specialty items not available in the county, most staples are purchased in the county. Based on the county's industrial diversity and its relative self-containment with regard to commuting and purchasing, Stevens County was assumed to comprise the economic region for this EIS.

Modeling of Economic Effects

The economic effects of the management alternatives for Little Pend Oreille NWR were estimated for this DEIS using IMPLAN, a regional input-output modeling system developed by the USDA Forest Service (Minnesota IMPLAN Group 1994).

Population, Employment, and Income

Population

The population of Stevens County was 38,567 in 1996. It declined over the 1950s and 1960s, grew relatively rapidly during the 1970s, grew very slowly during the 1980s, and has again grown rapidly in the 1990s (McGinnis et al. 1997). Between 1987 and 1996, the county's population grew by 27% (U.S. Bureau of Economic Analysis 1998), substantially faster than that of the state as a whole, with most of the growth occurring in the southern portion of the county. Much of the growth is accounted for by relocations of retirees and households with workers who commute to Spokane. Local communities are small, safe, and clean and have good schools, high-quality health care, and an affordable cost of living. The relatively pristine environment and a strong sense of place make the county attractive to growing families and retirees.

In 1996, 75% of the population lived in the unincorporated portion of the county (Washington State Employment Security Department 1997); in 1990, 60% of the population was classified as rural (McGinnis et al. 1997). The population is sparsely distributed over the land. Population density in the county is only 18% of the national average. The county seat and largest town in the county is Colville, with a 1992 population of 4,440. Only two other towns (Chewelah and Kettle Falls) have population exceeding 1,000. The population is 93% white, with nearly all the remaining population Native American. (McGinnis et al. 1997.)

Employment

The Stevens County economy is dependent on the timber industry, agriculture, manufacturing, mining, trade, and services. Its largest industries are logging, wood and paper products manufacturing, mining, and metal refining

In 1990, the Stevens County work force included approximately 12,800 people (U.S. Bureau of Economic Analysis 1998). Of these, occupation was determined for 11,583 people (McGinnis et al. 1997). Among workers covered by unemployment insurance, the principal employment sectors in 1996 were government (2,408 workers), services (2,302 workers), manufacturing (1,937 workers), and retail trade (1,563 workers); these sectors accounted for 87% of all covered employment in the county (U.S. Bureau of Economic Analysis 1998). Half the workers in the manufacturing sector are employed in the lumber and wood products subsector, which includes logging contractors and sawmill employees. An estimated 9.2% of the work force (more than 1,000 workers) was employed in the farming, forestry, and fishing sector in 1990 (McGinnis et al. 1997). Forestry employment consists mainly of private-sector foresters and forest technicians. Fishing accounts for virtually no employment in Stevens County. Most of the workers in farming are excluded from covered-employment statistics because they are self- or family-employed; many of them also are employed part time or seasonally (Walsh pers. comm.).

Between 1987 and 1996, the Stevens County unemployment rate averaged 9.8%. Although this rate exceeded the statewide and national unemployment rates, it was substantially lower than in adjacent Ferry and Pend Oreille Counties (Washington State Employment Security Department 1997).

Income

Average per-capita income in Stevens County was $16,062 in 1996, which was lower than the per-capita income in all but two of Washington's 39 counties. (All values are expressed in 1997 dollars in this analysis.) The key components of personal income in Stevens County in 1996 were nonfarm earnings (50.0%); transfer payments (25.8%); dividends, interest, and rent (17.1%); and farm income (1.1%) (U.S. Bureau of Economic Analysis 1998). In 1993, transfer payments consisted primarily of retirement payments (47.3%), medical payments (28.1%), income maintenance (10.1%), and unemployment compensation (8.9%) (McGinnis et al. 1997). As a share of total personal income, transfer payments are substantially higher for Stevens County than for Washington as a whole, while nonfarm earnings are substantially lower for the county than for the state (McGinnis et al. 1997).

Among the industrial sectors, mining provided the highest average annual earnings per worker ($36,435) in 1996. Mining was followed by manufacturing ($33,227), transportation and public utilities ($29,478), government ($25,025), and construction ($24,406). In all other sectors, average annual earnings were less than $19,000. (U.S. Bureau of Economic Analysis 1998.)

Refuge Management Economics

The existing Refuge staff consists of eight permanent and seven seasonal employees, who account for an annual payroll (including salaries and benefits) of $361,250.

In addition to providing salaries and benefits, the Refuge purchased goods and services totaling $5 8,482 in 1998, approximately 11% of which was spent in Stevens County. Some of these expenditures (e.g., for flood damage restoration and maintenance management system projects) were one-time costs not expected to be repeated. The baseline nonsalary costs of Refuge management were estimated at $160,482 per year. Approximately 85% of these purchases would involve wildlife- and habitat-related projects, with the remaining 15% involving public use-related projects.

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. For example, if the Refuge's budget increases, additional revenue will flow to Refuge employees and to the businesses in the region from which the Refuge purchases goods and services. The effects of a change in the Refuge budget on employment and personal income in the federal government sector are referred to as the "direct" economic effects. Changes in employment and income related to the resulting increased spending by other businesses in the region are referred to as "indirect" effects. Changes in employment and income related to the resulting increased spending by households in the region are referred to as "induced" effects. The total economic effect of a change in activity in one industry is the sum of the direct, indirect, and induced effects.

Each million dollars in nonmilitary federal government spending in the county results in an estimated total of 20.4 jobs and $1.19 million in personal income in the region, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

National wildlife refuges contribute funds to local counties through two revenue sharing programs, one that applies to Refuge lands reserved from the public domain, and one that applies to lands purchased in fee title. Nearly all Little Pend Oreille NWR lands were acquired in fee title. For fee lands, the federal government typically pays the counties up to 0.75% of the appraised value of the land each year out of the Refuge Revenue Sharing Fund. In 1996, for example, the federal government paid Stevens and Pend Oreille Counties a total of $253,944, which represented 72% of the maximum amount authorized. Because the amount of money paid to these counties is based on the appraised value of the Refuge lands, it would not vary among the planning alternatives.

Forest Products Economics

Approximately 71% of Stevens County's land base (or 1.2 million acres) is timberland. Of this timberland, 505,000 acres is in nonindustrial private ownership, with ownership of the remaining timberland divided among the federal government (250,000 acres), the forest industry (206,000 acres), state government (162,000 acres), and Native American tribes (94,000 acres) (McGinnis et al. 1997).

Between 1984 and 1994, the county's annual timber harvest increased from roughly 100 million board feet to more than 200 million board feet, with nearly all of the increase coming from private forests (McGinnis et al. 1997). The volume of timber harvested annually on the Refuge has ranged from 100 thousand board feet (MBF) to 250 MBF over the past 30 years, with an average harvest level of approximately 175 MBF.

For this analysis, the value of timber sold on the Refuge was estimated based on historical stumpage prices for all species of trees sold on national forests in eastern Washington (Warren 1998). Between 1991 and 1997, the annual average stumpage price in eastern Washington national forests ranged from $78 to $249 per MBF, with an average price for the 7-year period of $127 per MBF.

In addition to stumpage revenues, value is added at the logging and sawmilling stages of production, and this adds value to the regional economy. Logging contractors and sawmills accounted for 10% of the employment and 14% of the earned income in the county in 1996 (U.S. Bureau of Economic Analysis 1998). Nearly all timber harvested on the Refuge is harvested by local logging contractors, who then haul the logs to sawmills for processing into lumber. Three sawmills are located within 25 miles of Little Pend Oreille NWR. These mills purchase most of the timber harvested on the Refuge. Nearly all economic activity resulting from harvesting, hauling, and primary processing of Refuge timber contributes to the regional economy. Each million dollars in regional timber sales results in an estimated total of 17.1 jobs and $589,000 in personal income in the region, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

The all-grades weighted-average price of ponderosa pine and hemlock-fir lumber sold by sawmills in the Inland Region (including eastern Washington and Oregon, Idaho, and Montana) during 1991-1997 ranged from $451 to $638 per MBF, with an average of $543 per MBF (Warren 1998). Based on an average stumpage price of $127 per MBF, the combined value added at the logging and sawmilling stages was estimated at $416 per MBF.

Livestock Production Economics

Livestock production accounted for $16.3 million in sales (56% of all farm product sales) in Stevens County in 1992. Private pasture and rangeland accounted for 107,715 acres in the county. Of the 1,054 farms and ranches in the county, only 22 held public grazing permits, down from 36 in 1987. (McGinnis et al. 1997.) Pastures on Little Pend Oreille NWR are currently leased for cattle grazing to three or four local ranching families. Until 1997, 750-800 animal unit months (AUMs) on the Refuge were allotted to 4 grazing permittees; in 1997, the number of allotted AUMs was reduced to 350, when one permittee sold most of her herd. (An AUM is the average amount of forage consumed by one cow/calf pair in a month.) A 1985 Coordinated Resource Management Plan prepared by the U.S. Soil Conservation Service shows grazing units throughout most (36,640 acres) of the Refuge. In reality, most grazing normally occurs on approximately 6,000 acres of the Refuge, including forested uplands and the alluvial plains of the Little Pend Oreille River and Bear Creek, from June 1 through September 30.

The price of forage on national wildlife refuges is set by a formula specified by the U.S. Fish and Wildlife Service Manual. Between 1993 and 1997, the average price of forage on the Refuge was $7.03 per AUM (in 1997 dollars). This price is substantially higher than the $1.35 per AUM currently charged by the Colville National Forest (Ridlington pers. comm.). National forest grazing fees are set by a different formula specified by Congress.

Private rangeland forage is typically more expensive than federal rangeland forage; such forage has sold locally in the $10-$12 range in recent years (Kroiss pers. comm.). Nonrangeland forage sources (e.g., improved pastures or imported hay) are usually even more expensive per AUM than private rangeland forage.

Most cattle production in the Colville area consists of cow-calf operations, in which a full breeding herd is maintained year round, with calves produced and sold annually. Refuge permittees usually sell their calves at auction in Spokane (Cada and Larson pers. comms.). The average market price for calves sold in Washington over the 1988-1997 period was $97 per hundred pounds (Hammel pers. comm.).

Subsequent value added to these livestock (e.g., through feedlot fattening, finishing, and slaughtering) occurs outside the Stevens County economy. Nonetheless, Refuge permittees purchase locally much of the supplies, equipment, and services used in their operations. Each million dollars in range-fed cattle sales results in an estimated total of 29.4 jobs and $961,000 in personal income in the county, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994). Based on these rates, baseline livestock grazing at Little Pend Oreille NWR results in a total of 3.1 jobs and $98,000 in annual personal income in the county.

Recreation Economics

Estimated total recreation use of Little Pend Oreille NWR ranged from 17,000 to 25,000 visitor days during 1994-1997. Use in 1997 was estimated at 22,055 visitor days. Participation in big-game hunting, fishing, and wildlife observation accounted for the largest shares of the total use (Table 2-16). For this analysis, Refuge visitors who reside in Stevens County or Spokane County were considered to be residents because these visitors are unlikely to purchase lodging in Stevens County. Other visitors were considered to be nonresidents. Refuge use was divided between residents and nonresidents based on the judgment of the Refuge manager. As shown in Table 2-15, a large majority of Refuge visitors are residents, regardless of the main activities they pursue. Big-game hunting (primarily for white-tailed deer) attracts a relatively large proportion of visitors from other regions (primarily central and western Washington), and fishing (primarily fly fishing) attracts a large share of visitors from Spokane County. Unlike visits at some wildlife Refuges located along major highways, few visits to Little Pend Oreille NWR are brief stops made en route to other destinations; nearly all visitors use the Refuge as the primary destination for their day's recreation activities. Refuge visitors spend an average of at least 6 hours per visit.

Unlike forest products and livestock production, there is no single industry that includes most recreation activity. A recent analysis of recreation on national wildlife Refuges (Laughland and Caudill 1997) allocated recreation spending to four general categories (lodging, food/drink, transportation, and other), which in turn represented 18 separate industrial sectors. Estimated daily recreation expenditures by visitors to national wildlife Refuges in Washington are shown in Table 2-16. Refuge visitation accounted for an estimated $558,000 in recreation-related expenditures in Stevens County in 1997. Based on an allocation of recreation spending among industries similar to that used by Laughland and Caudill (1997), each million dollars spent on Refuge recreation in Stevens County is estimated to result in a total of 38.9 jobs and $919,000 in personal income in the county, including direct, indirect, and induced effects (Minnesota IMPLAN Group 1994).

Surveys indicate that recreationists often are willing to spend more for recreation opportunities than they actually pay (Laughland and Caudill 1997). This difference is called consumer's surplus and represents a net economic value for recreation consumers. Average net economic value per person per day was estimated at $75 for big-game hunting, $36 for fishing, and $34 for wildlife viewing in Washington (Waddington et al. 1994). Based on these rates, recreation use at Little Pend Oreille NWR was estimated to generate approximately $1.0 million in net economic value in 1997.

Table 2-14. Refuge Recreation-Use Levels (in Visitor Days) for 1998 and 2003, by Activity and Planning Alternative

		2003, by Alternative				
Activity	1998	A	B	C	D	E
Big-game hunting	5,000	5,796	5,796	6,083	5,255	5,938
Upland game hunting	1,100	1,275	1,275	1,338	1,156	1,306
Fishing	3,500	4,057	4,057	3,500	2,000	4,302
Wildlife and nature observation	4,200	4,869	4,869	5,360	5,360	5,110
Environmental education	155	180	180	198	163	189
Other	8,100	9,390	9,390	0	2,000	8,726
Total	22,055	25,568	25,568	16,479	15,934	25,426

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Table 2-15. Distribution of Refuge Visitors by Region of Origin (Percentage)

Recreation Activity	Resident		Nonresident
	Stevens County	Spokane County	
Big-game hunting	34	33	33
Upland game hunting	80	15	5
Fishing	30	55	15
Nonconsumptive use	55	32	13

Source: Refuge manager

Table 2-16. Recreation Expenditures per Person per Day (1997 $)

Sector	Big-Game Hunting		Upland Game Hunting		Fishing		Nonconsumptive Use	
	Resident	Nonresident	Resident	Nonresident	Resident	Nonresident	Resident	Nonresident
Lodging	0	2.27	0	2.50	0	9.89	0	10.87
Food/drink	11.19	27.30	9.50	28.00	10.38	28.69	9.58	18.50
Transportation	11.42	22.78	9.87	16.16	7.52	27.03	8.11	23.50
Other	0.10	0.38	1.53	0	1.40	2.14	0.23	2.17
Total	22.71	52.73	20.90	46.66	19.30	67.75	17.92	55.04

Source: Laughland and Caudill 1997.

Air Force Training Economics

The U.S. Air Force uses the Refuge to conduct survival training. Nearly all expenditures related to this training occur outside Stevens County. Exceptions include occasional truck refueling and restaurant meals for instructors. Such purchases total an estimated $1,500 per year (Steele pers. comm.).

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Chapter 3: Alternatives, Objectives, and Strategies

3.1 FORMULATION OF ALTERNATIVES

In this DEIS, an alternative is one of several options for managing the Little Pend Oreille NWR over the next 15 years. Each alternative is a combination of wildlife and public use management prescriptions applied in specific amounts and locations in order to achieve the Refuge Purpose, goals, and vision. Alternatives, developed to comply with NEPA, provide different ways to address and respond to major public issues, management concerns, and opportunities identified during the planning process.

Each major issue, activity, and management concern was evaluated and addressed for each alternative. A technique was used which identified a potential range of options from maximum to minimum for each major issue such as grazing, Air Force use, and recreational activities. Evaluation of the compatibility of activities and activity levels was integrated into the alternatives process. A theme approach was then applied to consolidate similar options and prescriptions into preliminary alternatives.

Preliminary Alternatives

Five preliminary alternatives were designed and presented to the public in a Planning Update (Issue 4) and in two public open house meetings, one in Colville and the other in Spokane on July 29 and 30, 1998. The five preliminary alternatives included:

- No change from past management; (Preliminary Alternative A)
- Restoration of wildlife habitat and management of existing uses; (Preliminary Alternative B)
- Restoration while emphasizing priority uses. This theme maximized the consistency between the Little Pend Oreille and the Refuge System Improvement Act, promoting the six priority recreation activities and eliminating or restricting most other recreational uses; (Preliminary Alternative C)
- A conservation reserve strategy maximizing wildlife needs and further reducing human impacts/disturbance to wildlife and habitats. (Preliminary Alternative D)
- A caretaker approach minimizing active management programs and activities (Preliminary Alternative E)

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Comments received from the open houses, mailed responses, and internal agency review were used to refine the range of alternatives. The Caretaker Alternative (Alternative E) was completely overhauled to combine the elements of Alternatives B and C.

Public reviewers also requested a more in-depth analysis of each alternative in the areas of economics and roads. An economist was hired to assist with the identification of costs and economic comparison of the alternatives. In addition, a more detailed road analysis was completed based on subwatershed units for the Refuge.

The preferred alternative is the alternative that would best achieve the refuge purpose, vision and goals; contributes to the refuge system mission; addresses the significant issues; and is consistent with principles of sound fish and wildlife management. *The new Alternative E (see description below) was identified as the preferred alternative.* The preferred alternative with associated objectives, strategies and projects is the draft CCP for the Little Pend Oreille NWR.

Previous Refuge planning documents, dating from 1946, are listed in the References section of this document.

Compatibility

The National Wildlife Refuge System Improvement Act of 1997 states that no Refuge use may be allowed unless it is first determined to be compatible. A compatible use is defined as one which, in the sound professional judgement of the Director, will not materially interfere with or detract from the fulfilment of the mission of the system or the purposes of the Refuge. Sound professional judgement is further defined as a decision that is consistent with principles of fish and wildlife management and administration; available science and resources; and adherence with law.

A draft compatibility evaluation is included in Appendix F for the key activities and uses identified in the range of alternatives. The compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility. The preferred alternative incorporates the stipulations to insure compatibility for each use.

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3.2 ALTERNATIVES SUMMARY

Description of Alternatives

This section describes five alternatives:

Alternative A: No Action-Status quo,
Alternative B: Restoration of Wildlife Habitat with Management of Existing Uses;
Alternative C: Restoration of Wildlife Habitat emphasizing Priority Uses;
Alternative D: Ecological Reserve Strategy; and
Alternative E: Combined Alternatives B and C (Agency Preferred)

ALTERNATIVE A: NO ACTION — STATUS QUO

This Alternative assumes no change from past management programs and is considered the base from which to compare the other alternatives. No changes would be made to the major current uses, which include Air Force survival training, livestock grazing, hunting, fishing, camping, snowmobiling, and horseback riding. In the past, management for game species has been very important and the Service fire management policy requires that all wildfires must be suppressed as quickly as possible. A detailed description of the existing programs and uses contained in this Alternative is found in the Affected Environment Chapter 3.

ALTERNATIVE B: RESTORATION OF WILDLIFE HABITAT AND MANAGEMENT OF EXISTING USES

Alternative B places new management emphasis on the restoration of habitat such as mature dry forest and riparian habitats that support declining and rare species of plants and animals. Under Alternative B, existing uses and recreation activities would be modified but continued. Recreation activities would include hunting, fishing, wildlife observation, camping, and horseback riding. The annual livestock grazing program would be continued but would have strict limitations on numbers of animals, locations, and time of year. A major change would be to move grazing out of riparian zones and high-elevation areas. This would require the building of additional fences to control livestock use. The Air Force survival training program would be continued, however, training intensity would be reduced and helicopter use eliminated except in emergency situations.

ALTERNATIVE C: HABITAT RESTORATION EMPHASIZING PRIORITY USES

This Alternative would also place management emphasis on mature dry forest and riparian habitats that support declining and rare species of plants and animals. Priority wildlife-dependent uses identified in the National Wildlife Refuge System Improvement Act of 1997 would be emphasized and in some cases expanded. These include hunting, fishing, wildlife observation, photography, environmental education and interpretation activities. Hunting opportunities would be expanded and additional effort would be spent on environmental education activities and interpretation. Other existing recreational activities such as camping, horseback riding, and snowmobiling would be eliminated. No annual livestock grazing program would be included but some limited livestock grazing may occur, in order to meet specific wildlife and habitat objectives. The Air Force survival training program would be discontinued.

ALTERNATIVE D: THE "ECOLOGICAL RESERVE" ALTERNATIVE

The focus of Alternative D is to manage the refuge as an ecological reserve, following some of the ideas of Noss and Cooperrider (1994). To some, the theme may evoke ideas of "passive management" such as often occurs in wilderness areas. However, objectives encompassed in Alternative D are more complex than a sole strategy of passive management allows. The key components of the Alternative are to promote habitat restoration, especially in the dry forest zone, to restore aquatic conditions to natural states, and to effectively enlarge roadless areas in the eastern refuge by reducing human intrusions.

Like Alternatives C, D, and E, this Alternative promotes restoration of forest habitats, especially within the dry forest type, using thinning and burning techniques. However, commercial thinning would be specifically excluded from areas that have never been logged, and low impact fire suppression techniques would be chosen whenever possible. Low impact techniques would include containment with hand lines as opposed to bulldozed lines, etc. Restoration of other natural systems and features would also occur, including the removal of artificial dikes, drainage features, fences, and several roads. Partnerships would be developed with surrounding land managers and landowners to create wildlife corridors and buffer zones for the refuge "core reserve" and to promote habitat unfragmented by artificial openings and roads at the landscape scale.

The Alternative would support the priority uses established under the National Wildlife Refuge System Improvement Act of 1997. Hunting and stream fishing would become the primary recreational activities. Wildlife observation, photography, environmental education and interpretation activities would be allowed. Hunting of forest predators such as bear, cougar, and bobcat would be eliminated, so as to diminish interference with the natural process of predation. Only no-trace camping would be allowed. Other uses such as horseback riding, livestock grazing and the Air Force survival training would be eliminated from the refuge.

The Alternative emphasizes reducing vehicular based human disturbances to wildlife and habitat, centered around the roadless areas in the eastern half of the refuge. Only four public access points to the refuge would be maintained; others that are now available would be blocked or gated. Blacktail Mountain road would be gated on the eastern end of the refuge as well as at the Blacktail Bridge throughout the year. Cedar Creek Road would also be closed to public entry. These closures would create a large area within the eastern half of the refuge (the "core reserve") that would remain essentially free of human disturbances throughout the year. Inholders access would be managed through a cooperative gating system.

ALTERNATIVE E: COMBINED ALTERNATIVES B AND C-- (*AGENCY PREFERRED)*

As a combination of Alternatives B and C, Alternative E places management emphasis on restoration of habitat components such as mature dry forest and riparian habitats that support declining and rare species of plants and animals. Under Alternative E, a mix of existing uses and priority recreation activities will be managed. A wide range of recreational activities would be supported including hunting, fishing, wildlife observation, camping, horseback riding, photography, and interpretation. Additional hunting seasons would be added. Interpretation, viewing, photography, and environmental education would receive added emphasis. Some recreational uses, such as camping, horseback riding and snowmobiling would continue, but would be restricted in some areas and during some seasons. Camping would be restricted in environmentally sensitive areas such as riparian zones, and would be confined to certain seasons. The annual livestock grazing program would be discontinued, however some periodic grazing may occur to meet wildlife objectives. The Air Force survival training program would be phased out over five years.

Features Common to all Alternatives

All Alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual Alternative descriptions.

- *Refuge Boundary and In-holdings*

  The Refuge boundary remains the same across all Alternatives. There is continued interest by the Fish and Wildlife Service to consolidate management of lands within the existing Refuge boundary. This could be done through management, protection, exchange or acquisition of the approximately 6500 acres of in-holdings within the boundary. A significant portion of these in-holdings are industrial timber land including Boise Cascade (approximately 1600 acres) and Stimson Lumber Company (approximately 4500 acres).

- *Other Refuge-Managed Parcels*

  The Little Pend Oreille NWR currently manages two fee properties outside of the approved boundary of the Refuge: the Norris Tract (54.7 acres) near Springdale, Washington and the Cusick track (298 acres) north of Cusick, Washington, and four conservation easements ranging in size from 10 to 65 acres in Stevens County. All of these properties resulted from Farmer's Home Administration land disposal through loan defaults. Fee title lands are transferred to the Service for management while conservation easements transfer only the rights of easement management and serve to protect wetlands and converted wetlands through restrictions that are perpetual. These tracts will be managed consistently with the management alternative selected for the primary refuge.

In addition, a step-down management plan will be prepared for each of these units. The Kalispel Tribe of Indians has expressed interest in cooperatively managing the Cusick unit which is located close to tribal lands. Partnerships will be considered for the cooperative management of outlying units.

- *Land Protection Strategy Outside Approved Boundary*

  The Service has the ability to protect and acquire key wildlife habitats outside of the approved Refuge boundary. Additional NEPA analysis will be necessary to evaluate the environmental effects of protecting or acquiring lands before they can be added. Land protection methods may include cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants would be considered for any of these approaches. Priority for protection will be lands adjacent to the refuge particularly riparian, wetland, Ponderosa pine and high elevation forest (above 4,000 foot elevation) habitats. Medium priority for protection will be lands adjacent to other Service managed properties in Stevens and Pend Oreille Counties and seasonally flooded agricultural lands within the Colville River floodplain.

- *Protection of the Kaniksu Unit. A Separate but Related Action*

  The Service is currently in the process of evaluating the potential acquisition of 720 acres being offered by one landowner northeast of Deer Lake, Washington. This property is referred to as the Kaniksu Unit. Approximately 550 acres of this property are under a perpetual wetland easement administered by the Natural Resource Conservation Service. A separate environmental assessment will be completed if the preliminary project proposal is approved by the Washington Office.

- *Protection of Existing Research Natural Areas (RNA)*

  Two Research Natural Areas (RNA)s on the Refuge will be maintained and protected for their research values. In general "passive" or natural management will be practiced in the RNAs, including "hands-off" management of wildfire unless external lands appear threatened. Baird Basin RNA is a 160- acre tract in the North Fork of the Bear Creek watershed, representing three forest cover types under the Society of American Forester's classification system: Larch-Douglas Fir (SAF 212), Ponderosa pine-Larch-Douglas fir (SAF 214) and Lodgepole Pine (SAF 218). Varline Grove RNA is an 80-acre tract representing the Lodgepole Pine cover type (SAF 212).

- *Protection of Roadless Area*

  A 5,520-acre roadless area exists in the southeast corner of the refuge that may have potential for wilderness designation. All of the alternatives considered in this draft CCP EIS would be managed in such a manner that the primitive roadless character of this

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area and associated values are not impaired. The roadless area of the Refuge will be studied further concurrent with development of the step-down Habitat Management Plan and the Public Use Management Plan to determine if it is suitable as a Wilderness Study Area.

- *Tribal Coordination*

  Common to all alternatives will be increased regular communication with American Indian Tribes who have an interest in the Refuge. The Kalispel Tribe of Indians, the Confederated Tribes of the Colville Reservation, and the Spokane Tribe of Indians are three local tribes the Refuge will work with regarding issues of shared interest.

- *Volunteer Opportunities and Partnerships*

  Volunteer opportunities and partnerships occur in all alternatives. These are recognized as key components of the successful management of public lands and vital to implementation of Refuge programs, plans and projects.

- *Refuge Revenue Sharing Payment*

  Annual payments to Stevens and Pend Oreille Counties will continue at similar historic rates under each alternative. Total payment made to Stevens County in 1997 was $231,804. If in-holding lands are acquired and added to the Refuge then the county payment will increase accordingly.

- *Salvage Harvest by Permit*

  Salvage harvest is allowed on the Refuge with a special use permit only, when wind or other events add excessive, high-risk fuels. This use will continue under all alternatives, where opportunities arise and where salvage could be used to further other forest habitat management objectives.

- *Firewood Cutting by Permit*

  The firewood cutting permit system remains the same under all alternatives. Current Refuge policy is to allow cutting between August 1 and November 1. Each permittee is allowed to cut up to two cords of downed wood within 200 feet of a designated road. The number of permits issued, cords allowed, and locations will vary from year to year based on conditions, demand, and need.

- *Maintenance and Updating of Existing Facilities*

  Periodic maintenance and updating of Refuge administrative facilities will be necessary regardless of the alternative selected. Facilities include the Refuge headquarters complex, one government residence and two cabins. Periodic updating of facilities is necessary for safety and accessibility and to support staff and management needs. Currently, the headquarters office is being expanded remodeled to add office space. Funding has been acquired to upgrade the storage building. Funding needs have been identified to upgrade and enlarge the shop and to renovate the Winslow cabin to provide volunteer housing.

- *Protection and Management of Cultural Resources*

  The Service has legal responsibility to consider the effects its actions have on archeological and historic properties. Under all alternatives, the Service will manage cultural resources in accordance with public law and agency policy. To this end, small projects will require a "Request for Cultural Resource Compliance" form be completed in conformance with the Programmatic Agreement among the U.S. Fish and Wildlife Service Region 1, the Advisory Council on Historic Preservation, and the State of Washington Historic Preservation Officer. Additional consultation, surveys, and clearance will be required when large projects are sponsored by the Refuge or when activities will affect properties eligible for the National Register of Historic Places (more than 50 years old).

- *Management of Minor Recreational Uses*

  Certain recreational activities are occasionally pursued on the Refuge. Under all alternatives, any group activity involving more than 25 people will require a Special Use Permit. Dog sledding and search and rescue will also require Special Use Permits. Antler collecting, mushroom harvest and berry gathering are considered incompatible uses (see Appendix F) and will not be allowed. Other recreational activities not specifically addressed in this document (cross country skiing, snowshoeing) will be allowed to continue on Refuge lands unless they are found to conflict with wildlife or habitat objectives

- *Wildlife Habitat*

  Important habitats for wildlife will be identified, protected, and enhanced including but not limited to suitable snags, downed wood, movement corridors, late successional forest communities, wetlands, and aspen groves

Alternatives Considered But not Developed in Detail

Caretaker Strategy

Under the caretaker strategy, Refuge management would be minimized, public use opportunities reduced and staffing would be kept to a minimum. With custodial management only those actions mandated by policy or regulation, such as fire suppression and noxious weed control would be undertaken. This preliminary alternative was presented to the public in the July 1998 Planning Update. Very little public response or interest was expressed. The caretaker alternative would not resolve resource issues or accomplish Refuge goals and objectives. Forest health would continue to decline with increasing risk for catastrophic loss of forest habitats from wildfire, insects, and disease.

Non-Commercial Harvest/Thinning

Under this alternative only non-commercial methods would be used to conduct the forest management practices in the Refuge. Non-commercial methods would include firewood permit sales to individuals and pre-commercial thinning and non-commercial thinning by staff or by contracts. This option was rejected for the following reasons.

The non-commercial techniques would take place over an extended period of time. It is unlikely that thinning treatments on the approximate 250 acre units could be accomplished within one "season". A short time frame is necessary so areas can be burned as a unit. A unit must be uniform in terms of its fuel loading, arrangement, size and relative moisture content. This can best be achieved if the slash cures uniformly after the stems are removed.

The demand for green ponderosa pine trees as firewood is relatively low and it is unlikely that enough interest would be generated in this type of scheme to accomplish the desired habitat outcome in a reasonable time frame. Past experience with this type of thinning has yielded poor results.

Overall wildlife disturbance would be extended under this alternative since the methods employed to manipulate the habitat would be far less efficient then harvesting commercially. Soil erosion, compaction and drainage impacts would also be magnified under this alternative. Numerous firewood permittees and thinning contractors would entail the use of vehicles intended for maintained roads rather then specialized for timber harvest. In general, vehicles not designed for use in the forest do much more damage then low ground pressure logging equipment properly used. Winter harvest, a desired season, would be nearly precluded under this alternative since average snow depths in the area would make the area inaccessible to vehicles.

Grazing Alternative Submitted by Permittees and NRCS

Local individuals interested in grazing on the Refuge submitted a grazing alternative for the CCP. This alternative was not included and evaluated in the Draft EIS, however their alternative did provide elements that were incorporated into the grazing option contained in Alternative B. The most significant difference between their alternative and Alternative B is grazing in the alluvial riparian valleys. The permittees' alternative proposed grazing to enhance wildlife habitat and improve conditions along Refuge streams. Based upon the current assessment of riparian and stream habitats, restoration is a critical need for up to 7 miles of alluvial riparian habitat. Alternative B allows grazing that enhances wildlife habitat but specifically excludes grazing from the alluvial riparian zones.

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Table 3-1 Summary of Alternatives

Program or Issue	Alt. A (Status quo)	Alt. B (Restoration of wildlife habitat and management of existing uses)	Alt. C (Restoration; emphasizing Refuge System Priority uses)	Alt. D (Reserve strategy, reduce human disturbances)	Alt. E (Combined B and C, Agency Preferred)
HABITAT RESTORATION PROGRAMS					
Forest management	Limited forest management. Some salvage activities and precommercial thinning. Limited prescribed fire and total fire suppression.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate Historical Range of Variability (HRV) within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest group. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription.	Restore natural forest structure and composition and role of fire, using thinning and prescribed fire. No commercial thinning in unlogged stands. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Employ low impact fire suppression techniques as much as possible. Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers.	Restore natural forest structure and composition. Aim for a mosaic of stands to approximate the appropriate HRV within each forest type. For the long-term, promote large tree size and stand development into mature and old stages over approximately 50% of the Refuge. Use precommercial and commercial thinning, selective harvest techniques, and prescribed fire. Suppress all wildfires outside of prescription Promote protection of wildlife corridors and buffer zones with neighboring land owners and managers
Riparian and stream management	No change; no plantings or restoration.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.	Repair/improve roads that limit fish passage or cause excessive stream sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for timber removal and road construction.	Breach dams and diversions to restore natural hydrology. Repair or obliterate roads limiting fish passage and/or causing excessive sedimentation; plant and stabilize streambanks. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction	Repair/improve roads that limit fish passage or cause excessive sedimentation; plant and stabilize streambanks. Instream flows take priority over diversion flows. Enact 200-foot setback from water bodies for dispersed camping, commercial thinning, and road construction.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Use of old fields and farms	Continue grazing on approximately 430 acres (65%) of the old fields and farms. Allow remaining openings to reforest naturally.	Plant up to 200 upland acres with perennial crops and exclude livestock grazing to provide wildlife forage and viewing opportunities. Allow about 135 acres to revert to native vegetation, using prescribed fire and thinning to enhance natural succession. Maintain remaining upland openings (390 acres) with grazing, mowing, prescribed fire, and other mechanical methods.	Same as Alt. B except that upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing.	No human created openings would be maintained. Plant or thin trees, shrubs, or native vegetation to enhance natural succession. Control weeds.	Same as Alt. B except that upland meadows would be maintained with prescribed fire, mowing, or other methods, with no annual grazing.
Noxious Weed Management	Use integrated pest management methods to treat 34 miles of road-side weeds plus 12 acres of non-forest habitats.	Use integrated pest management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the refuge by half by the year 2015.	Use integrated pest management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the refuge by half by the year 2015.	Use integrated pest management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 350 acres of non-forested habitats and 350 acres of forested habitats. Reduce noxious weed cover on the refuge by half by the	Use integrated pest management methods to reduce seed production by annually treating 50 linear miles of road-side weeds plus 250 acres of non-forested habitats and 250 acres of forested habitats. Reduce noxious weed cover on the refuge by half by the year 2015.

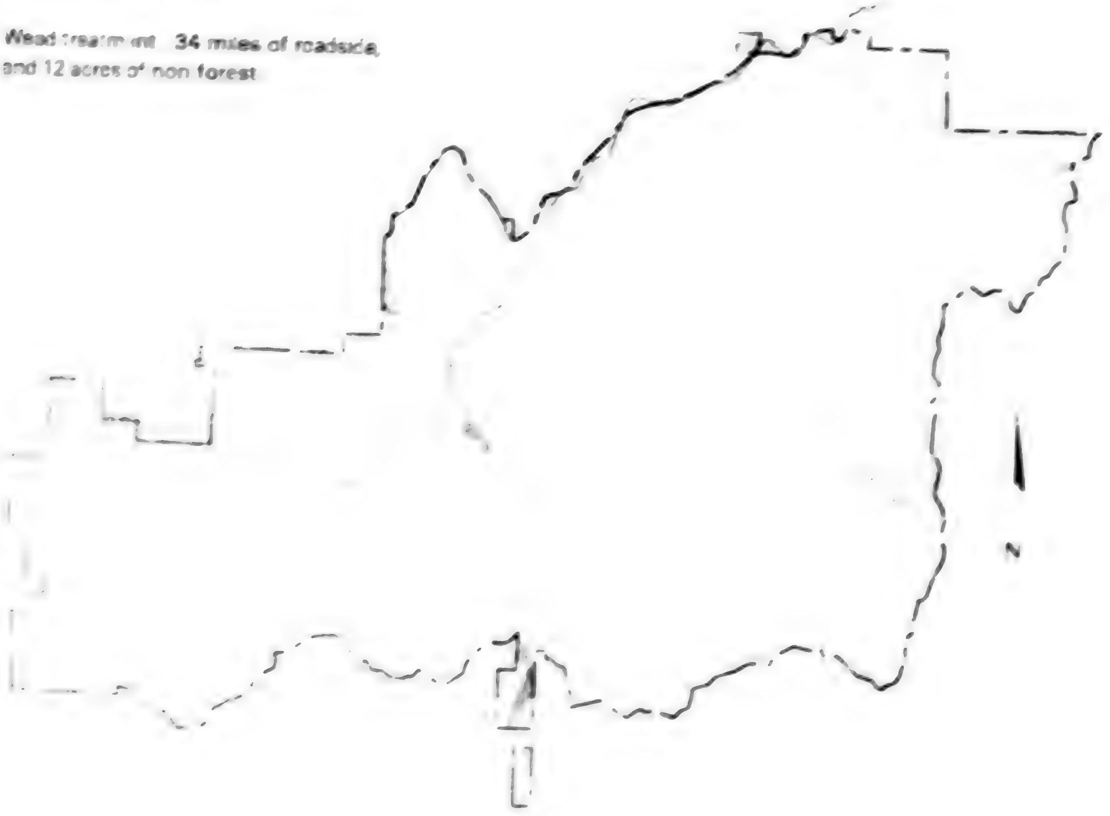
Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
PUBLIC ACCESS AND RECREATION					
Entrances and roads	No change (12 entrances, 201 miles of total roads, 91 miles of open roads). Open road density in 14 subwatersheds range from 0.2 mi/sq. mi. - 1.9 mi./sq. mi. Close selected roads during breakup.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan.1 - Apr.15. Close all but the county-maintained roads from Jan. 1 - Apr.15.	Eight entrances. Close or obliterate selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads Jan. 1- Apr. 15.	Four entrances. Close or obliterate numerous selected roads. Protect and enlarge effective roadless areas by closing roads to public entry, including Cedar Creek Rd. and Blacktail Mountain Rd. east of Blacktail Bridge. Manage inholder access through cooperative agreements. Open road density in 14 subwatersheds not to exceed 1.0 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15 Close all but the county-maintained roads Jan. 1- Apr. 15.	Eight entrances. Close or obliterate numerous selected roads as outlined in road management criteria. Open road density in 14 subwatersheds not to exceed 1.5 mi./sq. mi. from Apr. 16-Dec. 31 and 0.5 mi./sq. mi. from Jan. 1 - Apr. 15. Close all but the county-maintained roads and Jan. 1- Apr. 15.
Hunting	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	All state seasons Oct 1 - Dec 31. September seasons northern portion of Refuge only.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs.	Allow ungulate, gamebird, and waterfowl hunting. Eliminate predator (bear, cougar, coyote, and bobcat) hunting.	Expand quality hunting opportunities (spring turkey, grouse, and deer/elk bow hunts). Offer hunter education programs
Wildlife Observation, Interpretation, Photography	Minimal programs as staff time allows	Minimal programs as staff time allows	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.	Minimal programs as staff time allows.	Increase available viewing information and opportunities; offer programs, and events (e.g., summer youth program). Interpret natural and cultural history.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Fishing	Continue current April - October fishing opportunities. Lakes stocked.	Continue current April - October fishing season. Increase opportunities for natural spawning in lakes. Continue stocking program.	Continue current seasons and increase catch and release fishing on LPO River. Increase opportunities for natural spawning at lakes. Delay fishing opener on lakes until July 1 to minimize disturbance to nesting birds. Continue stocking program.	No stocking. Breach stream diversions and dams to restore natural hydrology.	Continue current April - October fishing season and increase catch and release fishing in LPO River. Increase opportunities for natural spawning in lakes. Continue stocking program
Camping	Unregulated. Five designated campgrounds & many dispersed sites.	Allowed in designated campgrounds and dispersed sites only between Apr. 15 and Dec 31. Eliminate dispersed riparian camping.	Eliminated	Primitive (no-trace) camping allowed only. Close off all campgrounds and camps accessible by vehicle.	Allowed in designated campgrounds Apr. 15 - Dec. 31 and designated dispersed sites only between Oct. 1 and Dec. 31. Eliminate dispersed riparian camping.
Horseback Riding	Unregulated	Develop equestrian plan, specifically addressing overnight use (Horse Camp only), trails, feed, and maintenance.	Eliminated	Eliminated	Develop equestrian plan, specifically addressing overnight use (Horse Camp only), trails, feed and maintenance
Off Road Vehicles	ATVs and dirt bikes are not allowed but illegal use occurs. Snowmobiling allowed only on Olson Creek Rd. and Blacktail Mtn. Rd. (from bridge east).	Eliminate illegal use with law enforcement patrols. Maintain snowpark, but discontinue snowmobiling on Refuge.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.	Eliminate illegal use with law enforcement patrols. Remove snowpark and discontinue snowmobiling on all Refuge roads and lands.

Program or Issue	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
OTHER PROGRAMS					
Livestock grazing	No change, up to 750 AUMs annually, based on coordinated resource management plan developed by Soil Conservation Service in 1978	Modified annual grazing program conducted outside low-gradient alluvial riparian areas and outside of high elevation areas (e.g. not above 3000'). Exclude livestock from ecologically sensitive areas including wet meadows. Livestock grazing would be concentrated in areas where it may provide a benefit to spring forage for white-tailed deer.	Phase out annual program; use grazing only as habitat management tool to achieve wildlife objectives.	Phase out annual program in five years.	Phase out annual program; use grazing only as habitat management tool to achieve wildlife objectives.
Air Force Survival School	No change. Use concentrated in late summer w/ an average of 90 personnel/day. Ground and helicopter use.	Reduced training use, allowing only activities not disturbing to wildlife. Eliminate use of helicopters except in emergency situations.	Phased out over five years	Phased out over five years	Phased out over five years
Cultural Resources Program	Protect cultural resources in accordance with law and policy	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.	Protect cultural resources in accordance with law and policy	Protect cultural resources in accordance with law and policy. Implement a proactive program to inventory and evaluate potential cultural resource assets.

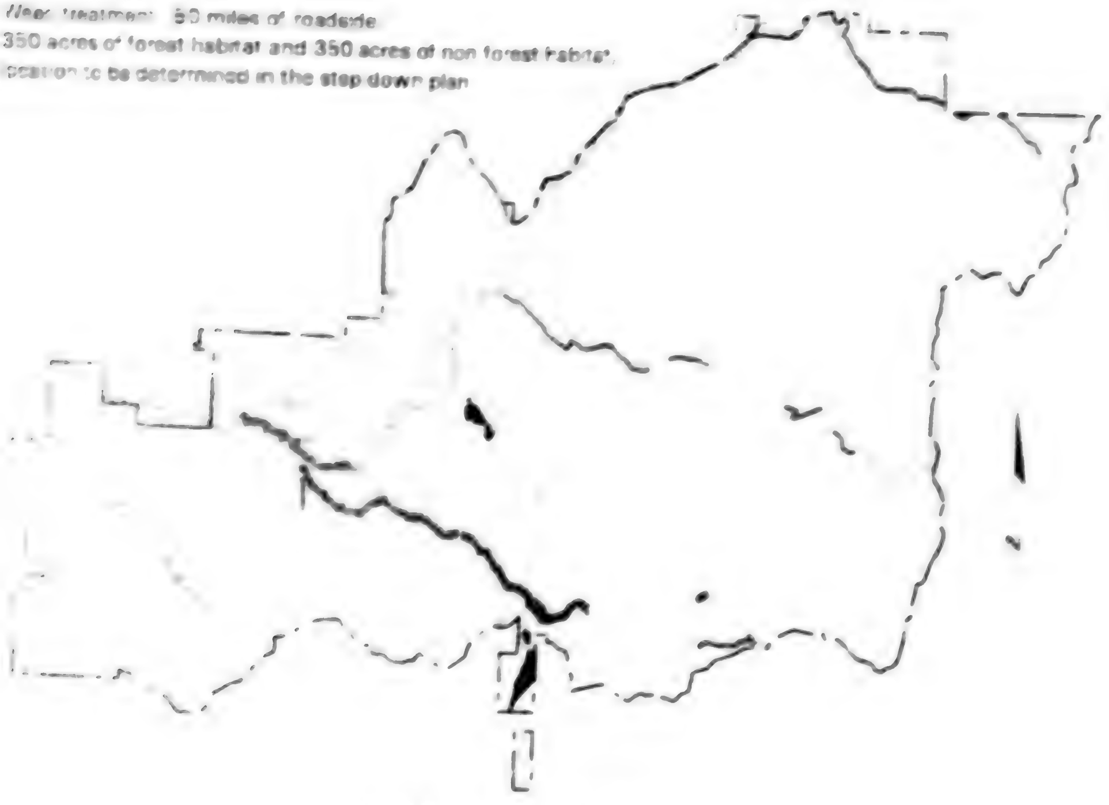
Alternative A

Weed treatment 34 miles of roadside,
and 12 acres of non forest



Alternative D

Weed treatment 80 miles of roadside
350 acres of forest habitat and 350 acres of non forest habitat,
location to be determined in the step down plan



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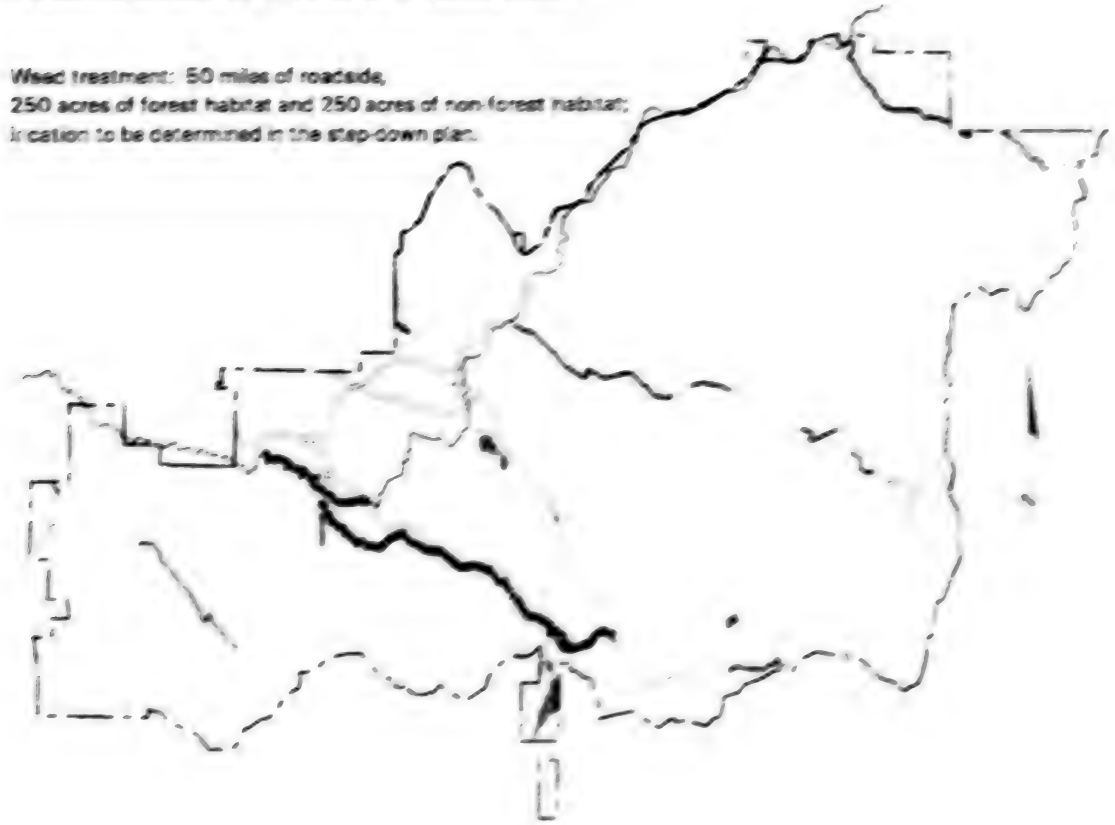
Alternatives B, C and E (Preferred)


Weed treatment: 50 miles of roadside,
250 acres of forest habitat and 250 acres of non-forest habitat;
location to be determined in the step-down plan.

Map 14. Restoration Actions (Alternatives A - E)
Little Pend Oreille National Wildlife Refuge

Priority Areas for Forest Thinning and/or Prescribed Fire
■ Priority Areas for Aquatic and Streambank Restoration
■ Priority Areas for Road Repair
■ Dam breach would return lakes to marshes (Alt. D)
■ Lakes, Streams and Marshes

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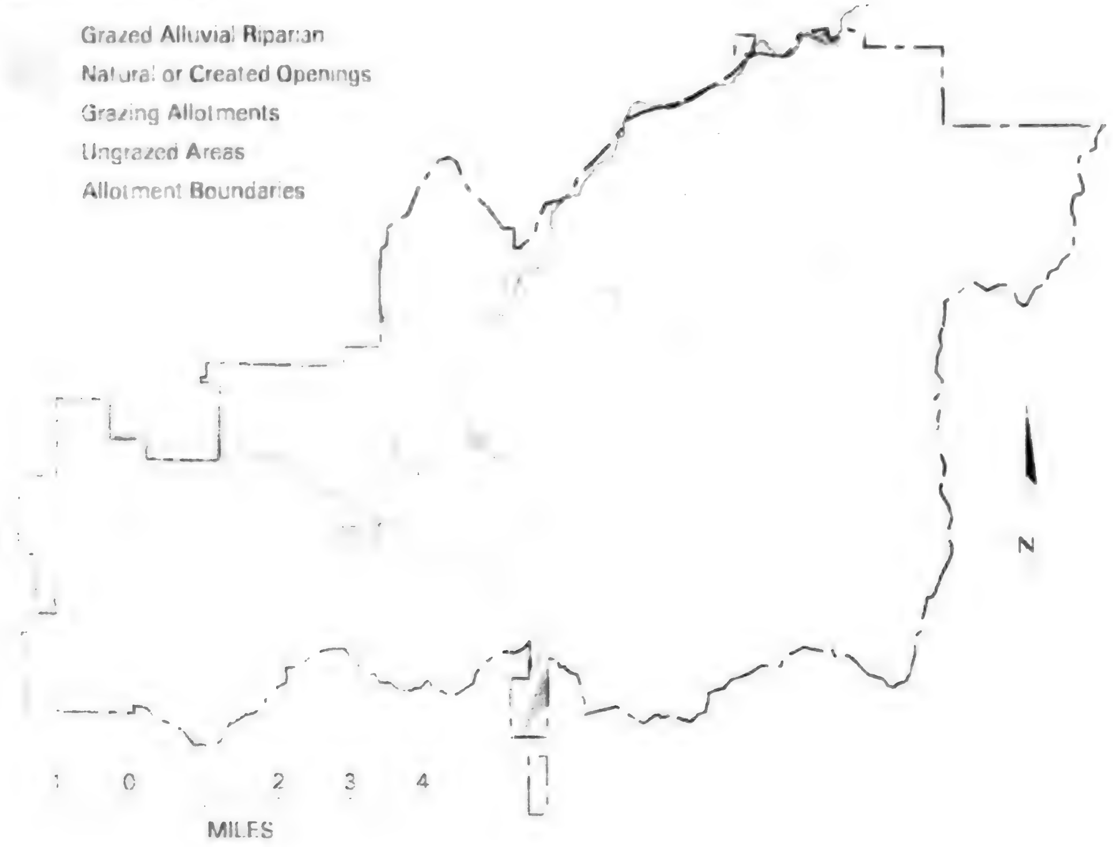
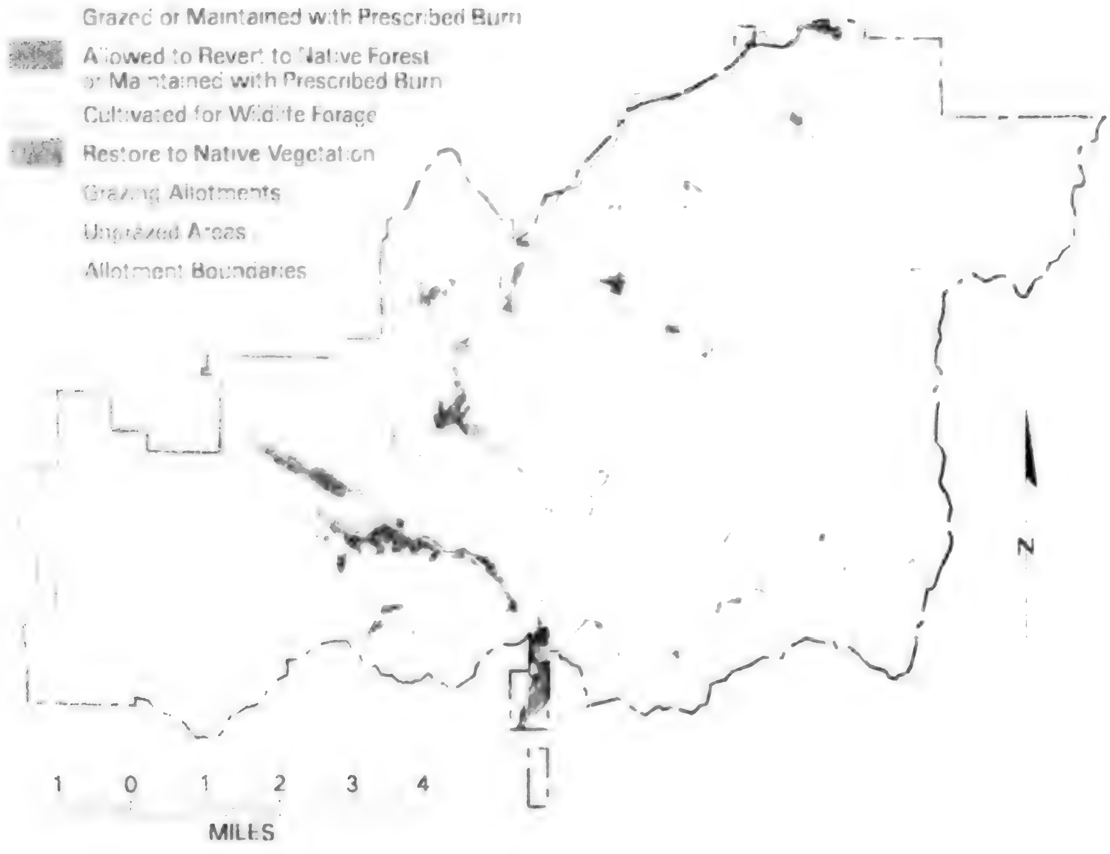
Alternative A



Alternative B


Grazed or Maintained with Prescribed Burn
Allowed to Revert to Native Forest or Maintained with Prescribed Burn
Cultivated for Wildlife Forage
Restore to Native Vegetation
Grazing Allotments
Ungrazed Areas
Allotment Boundaries
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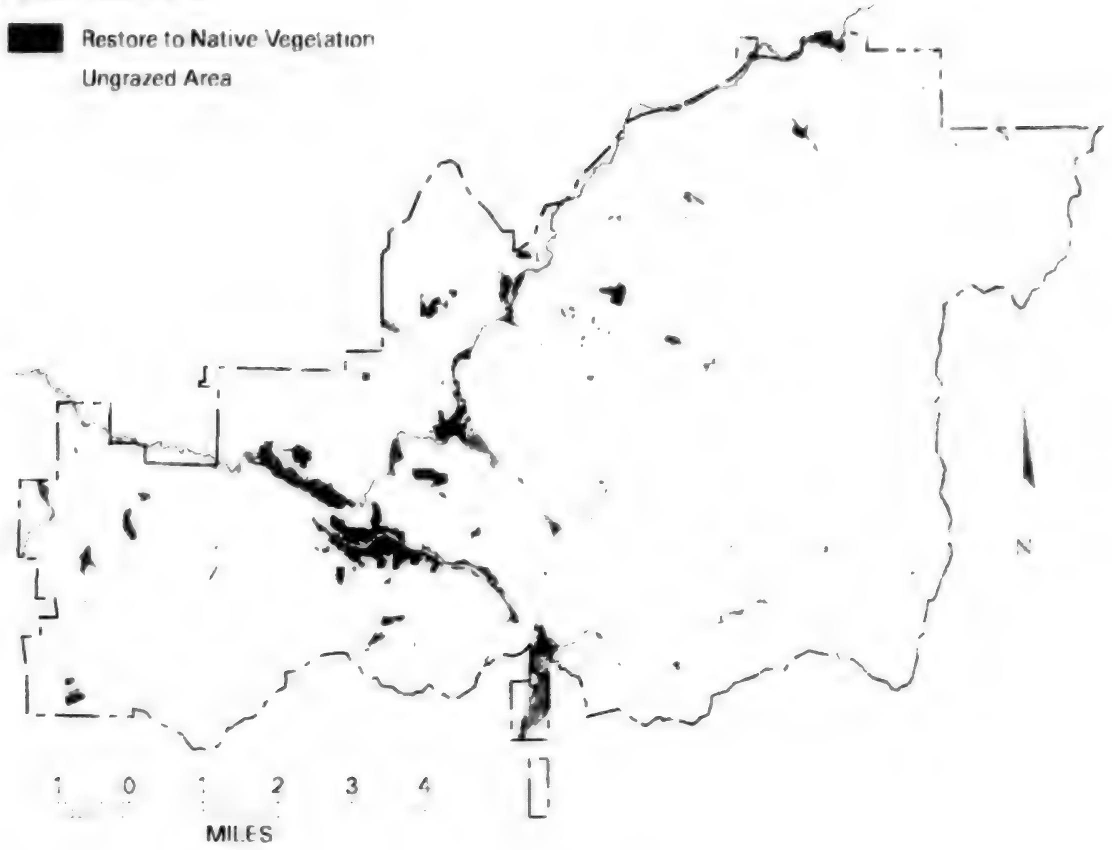
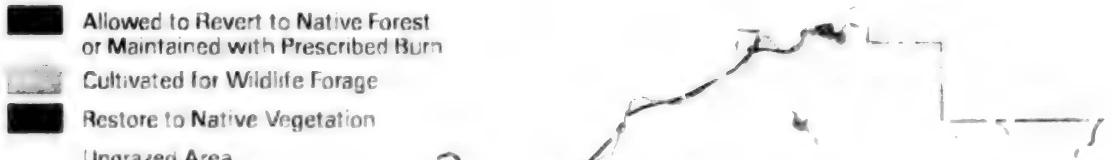
Alternative D



Alternatives C and E (Preferred)


■ Allowed to Revert to Native Forest or Maintained with Prescribed Burn
▨ Cultivated for Wildlife Forage
■ Restore to Native Vegetation
Ungrazed Area
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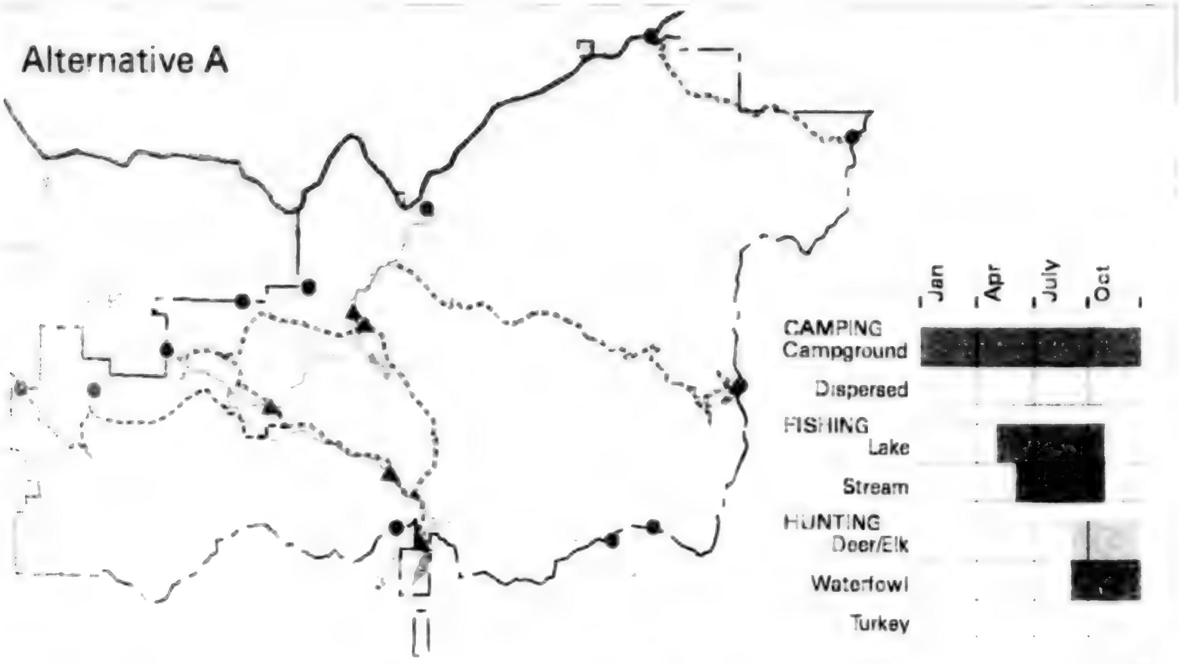
Map 16. Grazing and Fields Management (Alternatives A - E)
Little Pend Oreille National Wildlife Refuge

Alternative A



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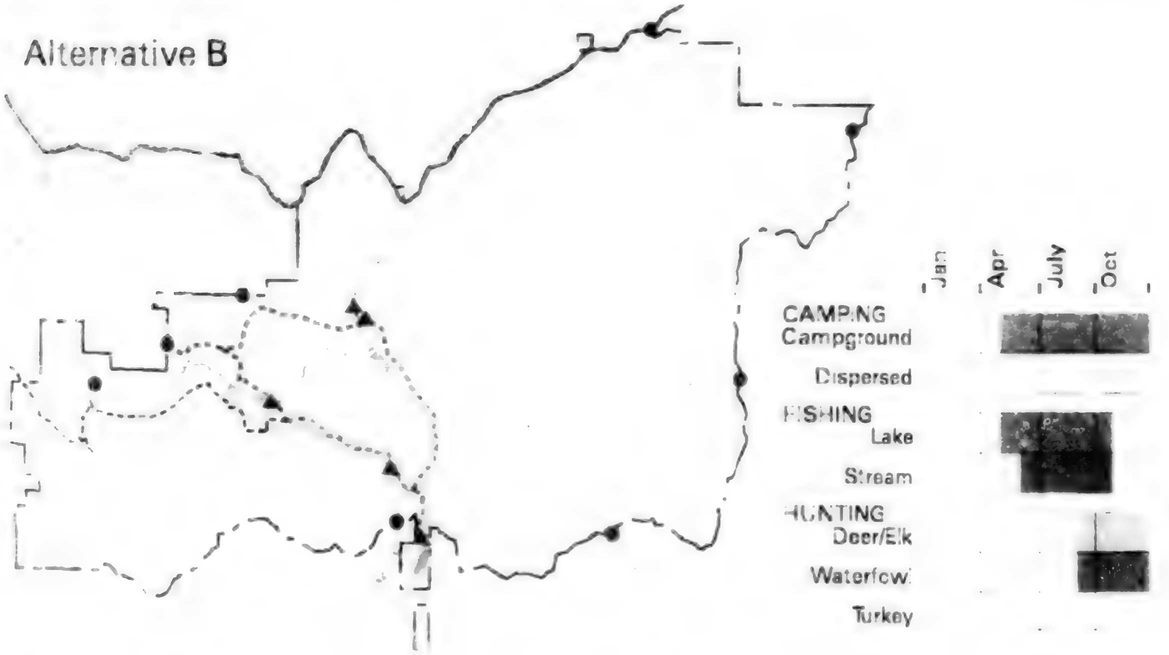
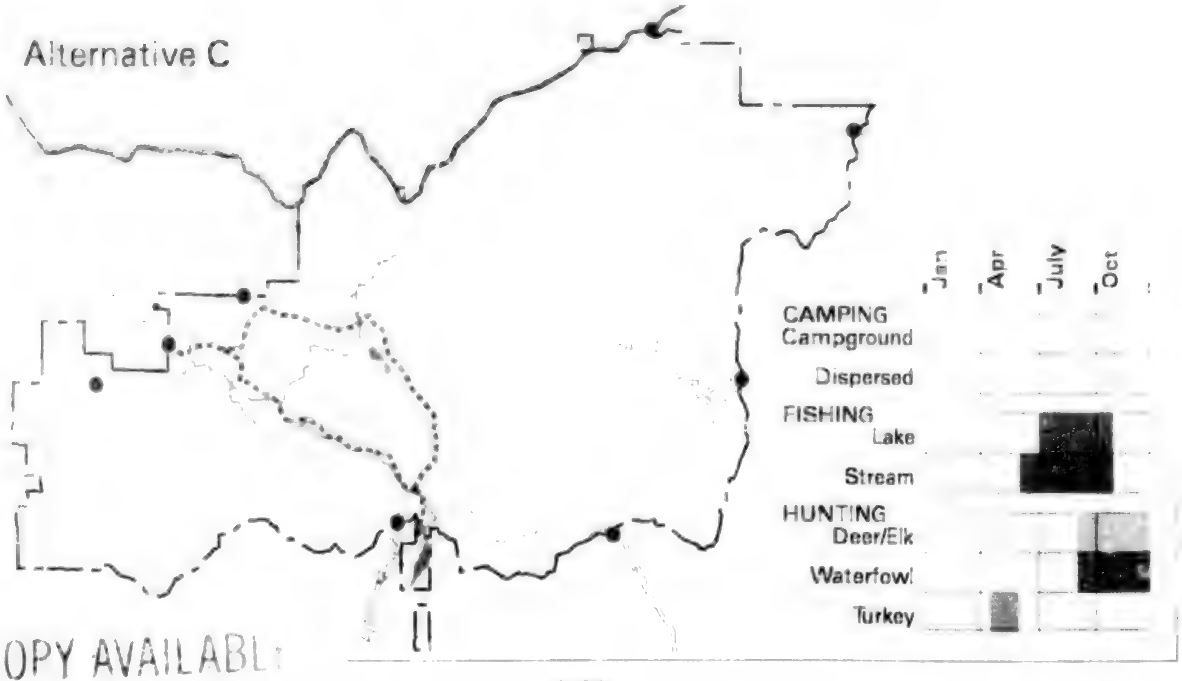


Alternative C



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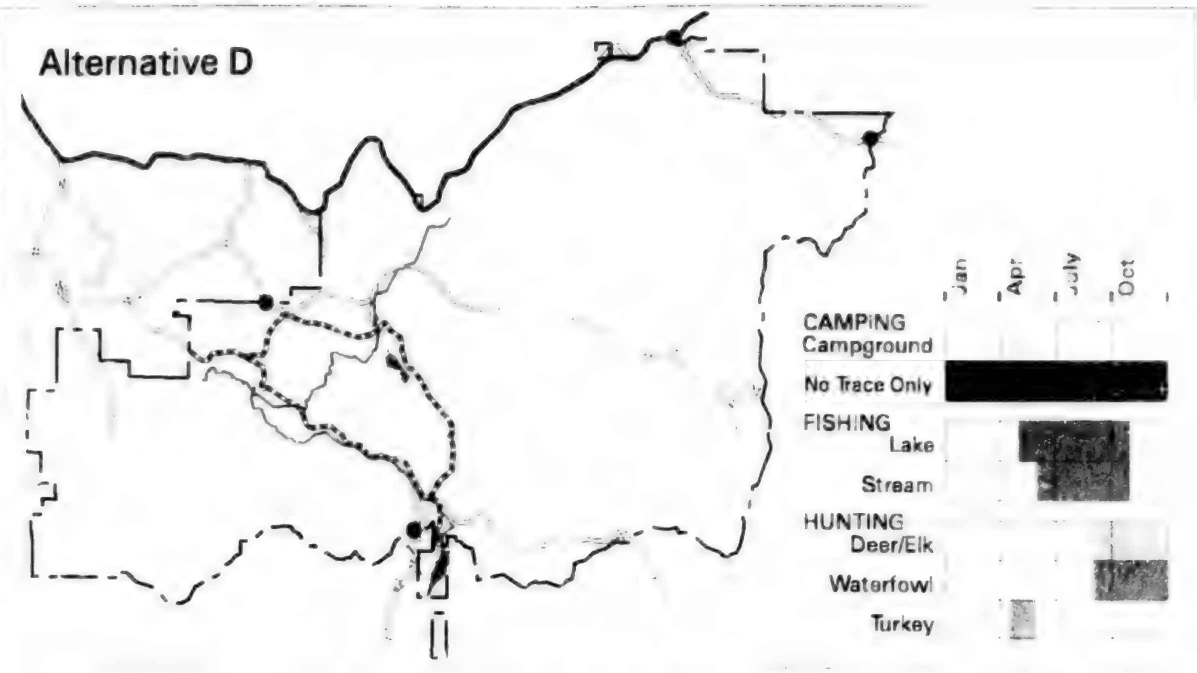

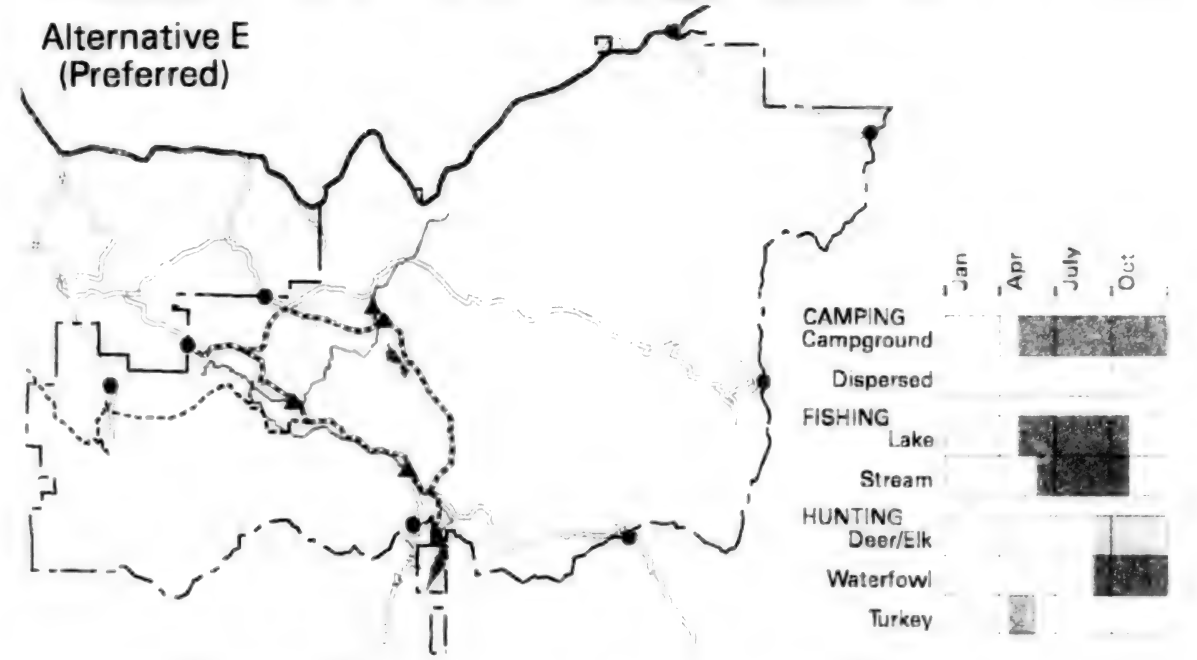

Map 15. Recreational Uses (Alternatives A - E)
Little Pend Oreille National Wildlife Refuge

Refuge areas open to Hunting (waterfowl hunting not allowed on streams)
Refuge areas closed to Predator Hunting
▨ Fishing in Streams, Lakes and Ponds
Old Rodeo Ride Horse Trail
Snowmobile Route
Wildlife Viewing Route
▲ Main Campgrounds
Dispersed Campsites
● Public Access Points
Snow Park

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3.3 DETAILED DESCRIPTION OF ALTERNATIVES and RELATIONSHIP TO GOALS, OBJECTIVES, AND STRATEGIES

Central to the concept of the CCP is the development of refuge goals. In addition, as part of the CCP, each refuge is expected to set objectives and devise strategies that will work in concert to help achieve the goals. Goals are broad visionary statements of the vision for refuge resources. Objectives are, where possible, quantified statements of a standard to be achieved or work to be accomplished. Strategies are work items that contribute toward accomplishment of the objective. Little Pend Oreille NWR goals, as presented in Chapter 1, are:

Goal 1: **Conserve, enhance and restore native forest, riparian, in-stream, and wetland habitats representative of the native habitat diversity of northeastern Washington.**

Goal 2: **Monitor, protect, and recover special status plants and animals and species of management interest.**

Goal 3: **Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats, and cultural history.**

Some of the current alternatives *emphasize* one goal over another, thus objectives and strategies differ somewhat among alternatives. This section describes and compares the objectives and strategies of each of the "action" alternatives (Alternatives B, C, D, and E) under the main programs operated by the Refuge. The main Refuge programs are:

- Habitat Restoration, including:
    - Forest Management,
    - Watershed Management,
    - Riparian and Stream Restoration, and
    - Management of Forest Openings, Old Fields and Meadows;
- Fish, Wildlife, and Plants Populations Management;
- Recreational Use and Access; and
- Other programs, including
    - Grazing program,
    - Air Force Survival School, and
    - Cultural Resources Management

Each of these programs is described by objectives (which may differ under different alternatives) in the following pages.

Except where otherwise noted, all objectives would have a fifteen year time frame for completion. It should be pointed out that the desired future habitat condition (for instance, restoration of large trees in dry forest stands) may not be fully achieved in fifteen years. The Refuge will measure success partly by the extent to which Refuge habitat conditions are moving towards the desired state and/or including the desired natural processes.

Habitat Restoration Program: Alternatives and Relationship to Goals, Objectives and Strategies *(contributes to Goals 1 and 2)*

The key objectives and strategies that would be associated with restoration actions under each alternative are detailed below, by main subprograms.

Forest Habitat Management Objectives and Strategies:

Alternatives B, C, and D, and E

Under Alternatives B, C, and E, most of the active forest manipulation in the next 15 years would be concentrated in the dry forest zone of the Refuge. A major management emphasis would be restoration of ponderosa pine habitat and associated plant communities in the dry forest zone as identified in the Map 3 of this draft CCP/EIS. In order to achieve the Refuge's first goal to conserve, enhance and restore native forest lands, management activities would focus on enhancing and increasing mature, single story ponderosa pine habitat.

Restoration actions would benefit a wide range of species (see Chapter 5) .

Dry Forest Stand Structure Objectives:

- ***Restore mature stand structure and fire ecosystem role in dry forest stands*** on up to 1000 acres per year (or until 90% is under regular fire management). Strive to create open stands dominated by scattered mature pine and larch trees to provide diverse natural habitat for wildlife and to reduce the risk of fire and disease.

- ***Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)*** within the dry forest zone: ~15 % early seral, ~35 % mid seral, and ~50% old single or old multi-layer (USDA and USDI, 1997, p. 2-56 and 3-32).

Understory Shrub Objective:

- ***Increase the percent shrub understory cover in mid and late seral stands***; increase shrub crown cover less than five feet in height to 40% or more (applies to forests below 3500 feet).

Strategies undertaken to achieve these objectives would include conducting pre-commercial and commercial thinning, as well as selective harvest on up to 15,000 acres in the dry forest zone to prepare stands for the introduction of prescribed fire. Timber thinning would be conducted "from below" (taking the smaller and less vigorous trees) in order to favor the healthiest and most vigorous dominants, primarily ponderosa pine, which have the greatest potential to reach maturity. Many mature trees exhibiting defects would be left standing for wildlife use. Unless they are safety hazards, all snags would be left standing and additional snags created where needed. In areas where large woody debris is lacking on the forest floor, trees may be dropped for wildlife cover.

Specifically, projects would occur in the pilot project areas known as Starvation Flats, Minnie Flats and Biarly Flats. (See Appendix G for detailed prescriptions for these three pilot projects).

Excess fuels would be removed or concentrated in stands where needed. Fire would be reintroduced in a controlled manner by applying prescribed burns under the guidance of the Fire Management Plan (contained in draft in Appendix G).

Construction of new roads would be minimized (some improvements to existing roads and trails may be required). Where commercial thinning would occur, opening new areas for log landings would be avoided, instead forwarding logs to openings along existing network of roads and fields. Using feller buncher type equipment where appropriate would avoid the need for an elaborate road or yarding system. Harvest times would be scheduled during the fall through early winter period to minimize ground disturbance.

Moist and Cold Forest Objectives:

- ***Protect, restore and maintain the biological integrity and connectivity of the higher elevation forest habitat zones.***
- ***Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)*** within the moist and cold forest zones: ~25 % early seral, ~40 % mid seral, and ~35% old single or old multi-layer (USDA and USDI, 1997, p. 2-56 and 3-32).

The moist and cold forest zones of the Refuge would be lower priorities for active restoration. However, management actions, including thinning and burning could occur in the moist and cold zones depending on identified needs, such as controlling disease, controlling noxious weeds, or

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enhancing habitat for special status species such as the lynx. Forest distribution, composition and seral status would also be mapped.

Strategy Unique to Alternative D: This Alternative would specifically avoid commercial logging in any previously unlogged stands.

Landscape Objectives and Strategies

Alternatives D and E

Landscape Connectivity Objective:	- ***Maintain or establish mature forest connectivity on a landscape scale with adjoining agencies and landowners***

In keeping with this objective, the Refuge would seek to develop partnerships and cooperative agreements to maintain "buffers" for the Refuge. Buffer zones would be designed to support Refuge purposes and goals in forest management prescriptions and employ, where necessary, alternative thinning techniques so as to require fewer roads and trails than the other alternatives.

Aquatic Habitat Management Objectives and Strategies:

Aquatic habitat on the Refuge is affected by the watershed condition, riparian zone uses, and the aquatic condition. All of the action alternatives emphasize improvement of aquatic habitat conditions, and would employ a variety of strategies to achieve this goal. The three interrelated components of aquatic habitat management include watershed management, riparian restoration, and aquatic restoration (includes in-stream, lakes and wetlands actions). Objectives and strategies for these three components would differ slightly across alternatives, primarily in the in-stream restoration component.

1. Watershed Management

Fifteen subwatersheds encompass the Refuge and surrounding lands, all contributing runoff to the Little Pend Oreille River, which then feeds into the Colville River downstream of Refuge lands. Twelve of the Little Pend Oreille River subwatersheds are on lands controlled by the Refuge. Maintaining and improving the habitat quality in the Little Pend Oreille River will require management programs, on and off-Refuge, conducted in a cooperative spirit with other agencies and landowners.

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Alternatives B, C, D and E

Watershed Partnership Objective:

- ***Restore and maintain the health of the Little Pend Oreille River in partnership with the Stevens County Conservation District and various landowners***

Watershed Health Objective:

- ***Reduce the effect of roads upon water quality and bank stability.***

To achieve these objectives, the Refuge would work to identify watershed and stream restoration projects contributing to the objective. The Refuge would cooperate to locate funding sources to support projects on private lands, and would work with fishery interest groups on fish habitat improvement projects.

In order to reduce road impacts upon water quality, new road construction would be minimized and roads causing significant stream obliteration would be repaired or obliterated.

The Refuge would also seek to identify and replace stream culverts that block fish movement or do not have adequate capacity for 100-year flood events.

2. Riparian Restoration

Alternatives B, C, D and E

Alluvial Riparian Restoration Objectives:

- ***Restore 7 miles of unsatisfactory alluvial riparian habitat*** along Little Pend Oreille River and Bear Creek, by the year 2015. Re-establish native vegetation and strive to achieve the following characteristics:

    1. a minimum of 80% stable banks with deep-rooted streambank vegetation;
    2. a regular source of large woody debris within 25 feet of the stream banks (available at least every 150 feet of stream length);
    3. a natural mixture of riparian vegetation seral stages including a recruitment source for large trees;
    4. productive (non-weedy) wildlife habitat native cover in artificial openings

- ***Restore mixed-deciduous riparian forest*** to their natural distribution within the Refuge and restore the native composition of trees, shrubs, sedges, rushes, grasses and forbs within these plant communities.

The strategies to achieve these objectives would include a variety of methods. A significant change would eliminate cattle grazing in riparian areas to allow for optimum growth of riparian vegetation. A strong revegetation program would be undertaken, with plantings of native deciduous and coniferous trees and shrubs. All revegetated sites would be monitored. The Refuge would also seek to determine the influence of deer on deciduous riparian shrubs and trees by establishing 2-3 deer exclosures in the flood plain of the lower Little Pend Oreille River. Noxious weed problems (in particular reed canarygrass) affecting the riparian zone would be addressed with integrated pest management techniques (see more under noxious weed objective).

Sites for riparian restoration would be prioritized, with areas of bank erosion or areas dominated by reed canarygrass receiving high consideration.

Riparian Protection Objective:

- ***Protect and maintain riparian habitats from loss of vegetation and soil integrity throughout Refuge.***

Sediment input to aquatic habitats and water quality degradation on the Refuge would be curbed by a new policy requiring 200 foot setbacks (or a buffer to the extent of the 100-year floodplain) from the edges of all streams, lakes and wetlands for camping, commercial thinning, road construction and any other practices causing detrimental changes in water quality, temperature, sediment deposit or vegetation removal.

3 Aquatic Restoration

Alternatives B, C, and E

Existing dams and diversions would be maintained under these alternatives. The key objectives for aquatic restoration under Alternatives B, C, and E would be to :

Stream Habitat Objectives:	• ***Improve stream habitat conditions*** for native fish and other aquatic wildlife, specifically aiming to meet or exceed the standards set for stream habitat components in the federal Inland Native Fish Strategy (INFISH) including: pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width depth ratio (USDA, 1995). Adopt newer standard when one is approved.
Flow objective: (Alternatives C and E only)	• ***Ensure that flows in the original channels of diverted steams take priority ever diversion flows.***
Marsh Maintenance Objective:	• ***Maintain or restore at least 100 acres of permanently flooded emergent marsh habitat,*** to benefit certain wading birds, ducks and amphibians.

In stream restoration projects would include any projects to restore natural channel form or deal with bank erosion issues that cannot simply be replanted. Site specific restoration plans would be developed for each of these sites with input from restoration experts. These types of restoration projects would emphasize natural hydrology, bioengineering techniques, and habitat for native salmonid and riparian bird species. Major earth disturbing projects would be evaluated for additional NEPA or other compliance requirements.

Diking, water control structures, beaver introductions and or vegetation control would be considered as tools to increase or maintain marsh habitat.

Alternative D

Alternative D includes the instream and wetlands restoration objectives described for Alternatives B, C, and E, but includes a modified lakes objective. (This essentially makes the flow objective moot for this Alternative).

Flow Objective:	• ***Return all aquatic habitats to natural condition***, flow levels, and morphology.

Under Alternative D, the natural hydrology of the Refuge would be restored to the maximum extent possible. This alternative differs from Alternatives B, C and E in that all aquatic habitats would be returned to their natural condition including the three Refuge fishing lakes. Diversion ditches and dams constructed to create the lakes or drain wetlands would be removed and the lakes and streams, and wetlands would revert back to original historic levels and flows.

Management of Forest Openings, Old Fields, and Meadows

As discussed in Chapter 2, the forest openings, old fields and meadows present special problems for the Refuge. Many are endowed with historical significance owing to their origin as homesteads during the pioneer period. However, the openings tend to harbor persistent populations of noxious weeds and natural succession back to forest is inhibited in many places by cattle grazing. Yet the openings also provide grassy areas utilized by cattle as well as presenting an opportunity for wildlife viewing where they break the forest.

Alternatives B, C and E

Noxious Weed Objective:	• ***Reduce weed seed production from noxious weeds.*** Treat 50 roadside miles, 250 acres of openings, and 250 acres of forested habitat each year. Reduce the amount of noxious weed cover on the Refuge by half by the year 2015.
Fields Management Objectives:	• ***Maintain approximately 80% of the fields as openings*** to provide a diversity of habitat structure, grass and herb forage for herbivores, enhanced wildlife viewing opportunities, and to maintain certain cultural resources.

The refuge would employ integrated pest management methods (see definition in Glossary, Appendix A) to reduce noxious weed infestation under these alternatives. Treatment should occur before seed production gets underway. Annual treatments as well as targeted monitoring would be necessary to assure that the Refuge is making progress towards the objective of ridding the refuge of half of the extent of noxious weeds by the year 2015.

Future management of openings would emphasize maintenance of grass and herbaceous cover on the majority of these openings. However, the strategies to achieve this would differ by alternative. Alternative C and E would employ cultivation and prescribed fire as primary tools but would exclude grazing except in certain circumstances. Alternative B would also employ cultivation and prescribed fire but would include grazing in many areas (outside of ecologically sensitive areas) as part of the grazing program.

Strategies to protect the cultural resources within these fields would include an inventory and evaluation of fields, orchards, and homesteads to identify those that are especially significant or interpretable. In addition, the refuge would develop a cadre of volunteers to collect information and make interviews concerning the refuge homesteads.

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Alternative D

Noxious Weed Objective:	• ***Reduce*** weed seed production from noxious weeds. Treat 50 roadside miles, 350 acres of openings, and 350 acres of forested habitat each year. Reduce the amount of noxious weed cover on the Refuge by half by the year 2015.
Fields Management Objective:	• ***Allow all created fields to return to native vegetation condition.***

The refuge would employ integrated pest management methods (see definition in Glossary, Appendix A) to reduce noxious weed infestation under this alternative. Openings would be largely left alone to revert to native condition; for the most part forest rehabilitation would be accomplished with passive methods. Trees will naturally establish themselves and will be allowed to grow and thrive. Under certain circumstances, trees would be planted in the openings and/or thinned to accelerate growth or succession.

Fish, Wildlife, and Plant Populations Management Program: Alternatives and Relationship to Goals, Objectives and Strategies *(contributes to Goal 2)*

Alternatives B, C, D and E

In cooperation with Washington Department of Fish and Wildlife and the Ecological Services branch of the U.S. Fish and Wildlife Service, the Refuge will emphasize conservation and recovery of native species under all action alternatives. Populations will be primarily affected by the habitat conditions available on the Refuge, thus the key methods to manage populations will remain in the habitat management program. However, some more direct population management tools, such as reintroductions of endangered species may be utilized where appropriate.

Native Species Conservation Objective:	• ***Emphasize conservation and recovery of native species, with emphasis on special status species and species of management interest.***

Conservation and recovery of native avian communities within priority forest types and riparian zones would be a priority. Conservation actions would focus on restoration and enhancement of habitat conditions to support healthy populations of forest and riparian birds communities with an emphasis on those species with ESA status, Nongame Bird Species of Management Concern, and PIF priority species in the habitats of interest.

Key locations (e.g. breeding areas) of special status plants and animals would be maintained and protected under all alternatives by the best known available methods.

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Management of traditional native game species will remain important, especially management of white-tailed deer and trout. However, introduced species will be passively managed, with no active measures undertaken to ensure their conservation. On the other hand, the Refuge will not actively manage against them unless their populations are conflicting with native species.

Non-native undesirable species such as noxious weeds and tench will be controlled and eliminated if possible. Tench, a non-native introduced fish species, lives in McDowell Lake and associated wetlands and contributes to lake turbidity and algal blooms. The Refuge will work cooperatively with the State and other interested groups in controlling these undesirable species through trapping, use of rotenone, or using other methods. The most effective method having minimal impact on native fish and wildlife will be favored.

Only targeted control of predators or burrowing rodents would be practiced, as necessary to protect trust species, public health, or refuge facilities, while meeting Refuge habitat, wildlife, and public use objectives..

The Refuge would manage for wild trout in streams and evaluate the potential to stock native fish and improve spawning potential in lakes.

Other population management actions will center on gathering population trend information, and to the extent possible, associated habitat condition information.

Wildlife and Fish Monitoring Objective:

- ***Build and maintain a professional wildlife inventory and monitoring program***. Conduct monitoring guided by scientific and statistical principles to confidently determine baseline populations, trends, and habitat associations for key Refuge species.

An important component of the population management program is having a handle on species presence. To achieve this, the Refuge would initiate a species inventory (presence/absence) for plant, aquatic, and terrestrial vertebrate species by the year 2000.

Due to the need for extensive inventory and monitoring throughout the Refuge, a priority system would be used to direct these efforts. Priorities would include pre- and post-treatment monitoring, special status species monitoring, and species of special management interest.

Because so much active management would occur under the action alternatives, a key strategy would be to adopt methodology for pre and post-treatment wildlife monitoring and conduct this kind of monitoring where habitat management actions would occur. This monitoring will provide data to evaluate whether treatments are having desired effects. This monitoring will be high priority and initially will include: Starvation Flat, pre-commercial thinning sites, alluvial riparian habitats along Little Pend Oreille River and Bear Creek, Minnie Flats, and Biarly Flats.

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All field staff will be trained in identification of special status species, and all sightings will be recorded. Baseline inventory for these and selected species of management interest such as American marten and other forest carnivores will be initiated immediately. In the year 2000, additional surveys will commence, targeting amphibians and bats.

The Refuge would continue to gather baseline data on avian species, particularly those identified by the U.S. Fish and Wildlife Service as Species of Management Concern and Partners in Flight priority species. In addition to continuing the monitoring avian production and survival (MAPS) survey and the breeding bird survey (BBS), the refuge will initiate specific assessments of forest and riparian avian communities using a variety of techniques to assess songbird abundance, use and diversity, as well as evaluate health of refuge avian communities by assessing key demographic variables. These variables will be related to characteristics of vegetation and habitat conditions to assist in developing habitat management strategies for land bird conservation.

In addition to special status and pre- and post treatment monitoring, annual evaluations will be made on harvested species including deer, grouse, and trout. Waterfowl monitoring will be done to understand how recreational fishing may be affecting bird use of lakes.

The refuge will continue to survey harvestable wildlife species. Population counts such as grouse drumming surveys and deer buck:doe:fawn counts will be conducted annually. Harvest assessments such as grouse wing barrel surveys, as well as angler and deer hunter harvest reports will continue.

Waterfowl pair and brood counts will be continued, with special emphasis on understanding how recreational fishing may be affecting bird use of lakes.

Recreational Use and Access: Alternatives and Relationship to Goals, Objectives and Strategies *(contributes to Goal 3)*

A. Recreational Uses

The National Wildlife Refuge System Improvement Act of 1997 affirmed that wildlife conservation is the primary mission of wildlife refuges and clarified that compatible wildlife dependent recreational uses are the priority general public uses of the System. Wildlife-dependent recreation is defined as a use involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.

More than in any of the other programs, the alternatives described for this draft CCP/EIS differ over the treatment of recreational uses. The alternatives interpret the six "priority" uses in slightly different ways. The six priority uses are included in all alternatives, but emphasized to a greater extent in Alternatives C and E.

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Other recreational uses that presently exist on the Refuge would be managed differently under the alternatives. Alternative B seeks to maintain traditional recreational uses, with modifications to reduce impacts on Refuge resources. Alternative D de-emphasizes recreation of a particularly disturbing nature. Alternatives C and E emphasize the priority uses and eliminate or reduce many others.

Under all alternatives, the recreation character of the Refuge would continue to be semi-primitive. Minor improvements would be made to facilities but would be limited.

Within two years of CCP approval, Refuge staff would begin writing a step-down Public Use Management Plan to expand on and provide more detail for Refuge recreation. Game and fish components will be written in cooperation with the Washington Department of Fish and Wildlife.

The alternatives were developed in light of the national standards adopted by the Service to initiate, administer and evaluate all public uses on National Wildlife Refuges:

1) The activity will be compatible with the major purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

2) Funding will be available for the development, operation, and maintenance of the activity.

3) The activity will not adversely influence the desired base populations or communities of Refuge fish and wildlife.

4) All activities will be coordinated to minimize conflicts and wildlife-dependent activities will receive enhanced consideration over other forms of recreation.

5) Current demands and opportunities for the activity in the vicinity of the Refuge will be periodically evaluated.

1. Refuge System Priority Uses

a) Fishing

Alternatives B, C, and E

Fishing Opportunity Objective:	• ***Provide a range of high quality lake and stream fishing opportunities*** to approximately 6000 visitors per year, providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, and an opportunity to use various angling techniques.
Natural Spawning Objective:	• ***Improve conditions for natural spawning in lakes.***

The fishing program would strive to maintain fish population levels appropriate for habitats and provide a quality recreational experience for anglers. Overall, the fishing program would aim to provide a fishing experience superior to that found on other private and public lands. In keeping with this, motorized boating would be eliminated.

To reduce reliance on annual stocking in Bayley Lake and allow fish to grow to large sizes, it is recommended that Washington Department of Fish and Wildlife consider making this a catch-and-release only fishery.

Artificial lake habitats (McDowell Lake, Potter's Pond, and Bayley Lake) would continue to be stocked with non-native coastal rainbow trout. The Refuge would work with the State to cease stocking eastern brook trout. In addition, the Refuge will seek out native stock sources for stocking and use if available. Stream habitats would be managed primarily for wild trout, with an emphasis on catch and release fishing to conserve native species. In addition, no stocking would occur in Refuge streams for recreational fishing.

Strategy unique to Alternative C: Delay fishing opener on lakes until July 1 to minimize disturbance to nesting birds.

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Alternative D

Fishing Opportunity Objective:

- ***Provide high quality stream fishing opportunities*** to approximately 2000 visitors per year, providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, and an opportunity to use various angling techniques.

This Alternative incorporates a greater emphasis would be placed on the conservation and recovery of native fish stocks, together with restoration of the natural hydrological regimes at the refuge. In keeping with this emphasis, no stocking of non-native fish would occur at all. Dams and diversions would also be breached, returning the lakes to their natural condition. Fishing opportunities would still be encouraged, but would mainly be available on Refuge streams.

b) Hunting

Alternatives B, C, D, and E

Hunting Opportunity Objective:

- ***Together with the State, expand quality hunting experiences on the Refuge.*** This includes providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport, for approximately 10,000 visitors each year.

Strategies for Alternatives C and E: These Alternatives focus on adding new seasons, hunter education classes and providing hunters access to parts of the Refuge now under an Air Force closure. However, the hunting closure would be retained from January through April 15. Road closures would be adopted as a way to increase animal security, reduce road hunting, and improve the quality of the hunt.

Strategy for Alternative D: This Alternative eliminates predator hunting, but retains the current seasons for other hunted species. This Alternative also includes road closures as a major component.

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c) Viewing, Photography, Interpretation, and Environmental Education

Alternatives B and D

Viewing, Photography, Env. Ed and Interpretation Objective:

- ***Accommodate wildlife viewing, photography, and interpretation.*** Conduct limited environmental education.

These alternatives would accommodate wildlife viewing and photography by maintaining Refuge habitats in good condition for wildlife. Interpretation and environmental education activities would be accorded a lower priority and would be implemented only as funding and staff time become available.

Alternatives C and E

Viewing, Photography, Env. Ed and Interpretation Objective:

- ***Expand opportunities for wildlife viewing, photography, and interpretation.*** Explore opportunities for expanding an environmental education program.

These alternatives would promote additional wildlife viewing and photography on the Refuge. Interpretation of natural features would be emphasized, with kiosk construction and brochure development a priority. These alternative would seek partnerships with citizens in developing a Refuge-specific wildlife viewing leaflet. Funds would be sought to improve roads and provide an auto tour route with interpretive signs relaying specific themes of Refuge habitats, wildlife, and history. There would be an effort to stage annual events celebrating Refuge wildlife, particularly around the International Migratory Bird Day in May and National Wildlife Refuge Week. Refuge staff would explore opportunities to develop the old Winslow logging railroad grade as an interpretive trail. Rails to Trails is one possible source of funds for such a project. These projects would rely on funds over and above annual operating dollars.

A volunteer program would be necessary to support an on-site environmental education program. There has been little demand for this type of program but that could change in the future. In the interim, Refuge staff will provide environmental education programs on an as-requested basis as other priorities and time allow. Participation in environmental education activities off-site will also be conducted. Teacher workshops could be one way to encourage use of the Refuge as a site for learning about habitats and wildlife.

2. Other recreational uses

Recreationists have long used Little Pend Oreille NWR for a variety of other recreational activities which are now considered non-priority under camping, horseback riding, and other uses (described in further detail in Chapter 3). The alternatives have different objectives with respect to the non-priority uses and thus are presented separately below.

a) Camping

Alternative B

Camping Objective:	•	***Minimize impacts associated with Refuge camping,*** especially along riparian areas and during the sensitive winter period.

Camping would be "managed" under Alternative B to allow use to continue, but with decreased impact to Refuge resources. Some dispersed camping sites would remain open but dispersed riparian camps within 200 feet of water, or in sensitive floodplain areas would be closed. Camping with horses would only be allowed in Horse Camp. Law enforcement patrols of Refuge camps will be made regularly throughout the camping season.

Alternative C

No objective is adopted for camping under Alternative C. This activity would be eliminated from the Refuge entirely under this Alternative.

Alternative D

Camping Objective:	•	***Minimize impacts associated with Refuge camping,*** specifically reducing vehicular disturbance and compaction of sensitive areas.

Camping would still be allowed under this Alternative, but no permanent campgrounds or dispersed sites would be designated and maintained. Only no-trace camping would be allowed, as appropriate with the "reserve" theme of Alternative D.

Alternative E

Camping Objective:	•	***Minimize impacts associated with Refuge dispersed camping, especially along riparian areas and during the sensitive winter and spring/summer periods.*** Create a Refuge camping program supportive of Refuge System priority uses.

Like Alternative B, this Alternative strives to accommodate some traditional uses but with limits to ensure minimal impact to Refuge resources. Camping is most popular in the early part of the fishing season and during the deer hunting season. The strategy to support the objective of restructuring Refuge camping so that it supports the Refuge System priority uses would limit

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dispersed camping to late fall. Some dispersed sites will remain open but dispersed riparian camps within 200 feet of water, or in sensitive floodplain areas would be closed.

Campgrounds would remain open, but only April 15-October 15. Basic improvements would be made to some Refuge campgrounds including new, wheelchair-accessible toilets, designated sites, fire pits, and running water. There are a few sites within the campgrounds that are causing severe riparian degradation; these few sites would be permanently closed.

Camping with horses would only be allowed in Horse Camp. Law enforcement patrols of Refuge camps will be made regularly throughout the camping season.

b) Horseback Riding

Alternatives B and E

Horseback Riding Objective:	• ***Minimize impacts associated with Refuge horseback riding.*** Produce an equestrian plan in cooperation with riders.

Alternatives C and D

There are no objectives associated with this program, since the horseback riding would be eliminated under this Alternative.

c) Off-Road Vehicles

Alternatives B, C, D, and E

Off-road Vehicles Objective:	• ***Minimize disturbance impacts of off-road vehicular uses. Allow legal ATV use on designated roads only. Discontinue all snowmobiling on the Refuge.***

These alternatives all embrace the concept of controlling disturbance to wildlife caused by off-road vehicles, especially in the wintertime. Snowmobiling would no longer be allowed at the Refuge under any of the alternatives, and the snowpark would be obliterated under all action alternatives except Alt. B. Summertime ATV use would still be allowed on designated roads only and illegal incursions off designated ATV roads would be controlled through law enforcement patrols.

B. Access and Roads

There are currently 12 entrances or informal access points to the Refuge, and at least an additional seven unauthorized access points to the Refuge. Many of these are unofficial

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entrances that have been kept open for management and occasional public use. Several require access through private land.

Alternatives B, C, and E

Access Control Objective:	- ***Designate eight official entrances.***
Open Road Density Objective:	- ***Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile during winter and 1.5 miles/square mile during summer.***

The Refuge staff would achieve the low densities desired during the winter period by closing all but the county-maintained roads from January 1 - April 15. Seasonal or periodic closure of certain roads is a typical management practice that would continue to be used in managing public use. Selected roads would be closed during critical times such as nesting season and winter use by white-tailed deer. Other roads may be closed past April 15 because of snow depths or to protect the roadbeds from erosion during snowmelt. Cooperative agreements with the managers of inholdings would be pursued to achieve the lower road densities and access objectives.

Alternative D

Access Control Objective:	- ***Designate four official entrances.***
Open Road Density Objective:	- ***Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile during winter and 1.0 miles/square mile during summer.***
Roadless Area Protection Objective:	- ***Buffer or protect the integrity of current roadless areas .***

The Refuge staff would achieve the low densities desired during the winter period by closing all but the county-maintained roads from January 1 - April 15. Seasonal or periodic closure of certain roads is a typical management practice that would continue to be used in managing public use. Selected roads would be closed during critical times such as nesting season and winter use by white-tailed deer. Other roads may be closed past April 15 because of snow depths or to protect the roadbeds from erosion during snowmelt.

Alternative D incorporates an additional objective to effectively enlarge or buffer the roadless areas located in the eastern half of the Refuge by closing adjoining roads to public traffic. Specifically, Blacktail Mountain Road would be gated east of Blacktail Bridge and where it crosses the refuge boundary at the eastern border. Cooperative agreements with the managers of inholdings would be pursued to achieve the lower road densities and access objectives.

Alternatives B, C, D and E

Road Minimization Objective:

- ***Ensure no net increase in the total miles of Refuge roads. No new roads in RNAs or roadless areas.***

These alternatives would recommend no net increase in the total miles of roads on the Refuge (regardless of whether the road would be closed or unclosed). Construction of new roads would be minimized through maximum reliance on existing roads. Any new roads required by management would be offset by the closure of a corresponding length of old road. This will allow management flexibility within a certain limit. If new road construction is required, roads will be properly located and constructed to minimize adverse environmental impacts. Signing would also be expanded.

Public Access Roads Objective:

- ***Employ the following criteria to determine whether roads shall be kept open and maintained for public uses.*** (Roads not meeting these criteria may still be necessary in some cases for management purposes; these shall continue to meet basic safety standards.)

1. Traffic has minimal disturbance on wildlife populations
2. Road has minimal impact on wildlife and fish habitat. (Excessive runoff and sedimentation controlled through proper design and maintenance)
3. Vehicle access is necessary to support primary wildlife-dependent activities of the Refuge including: wildlife observation, hunting, fishing, wildlife photography, environmental education and interpretation
4. Road is necessary to provide access to the five Refuge campgrounds
5. Roads meet basic safety standards for road type
6. Funding is available to make periodic improvements and repairs.
7. Traffic does not adversely affect recreational experience of primary activities

Refuge roads open to the public would be evaluated under the above criteria for need, and environmental and wildlife impacts.

A network of management roads would be maintained to allow for periodic Refuge management practices such as habitat monitoring, selective timber harvest, fire management and control, habitat restoration and law enforcement activities. Management roads will be gated and posted with signs indicating "Authorized Vehicles Only". Roads not necessary for management will be abandoned and left to revert to a natural condition or obliterated.

Other Programs: Alternatives and Relationship to Goals, Objectives and Strategies

A. Cultural Resources Program

Alternatives B, C, and E

Cultural Resource Objective:	• ***Implement a proactive cultural resource management program***

In partnership with local Tribes, historical societies, Universities, the FWS Region 1 Cultural Resource Team, and using the cultural resource overview by Renk and Miss (1998) as a point of departure, Little Pend Oreille NWR will establish a cultural resource program using the following strategies: Conduct a stratified sample survey to identify areas that contain evidence of prehistoric occupation, such as stream terraces, ridge lines, and natural shorelines. Inventory and evaluate fields, orchards, and homesteads to identify those that are especially significant or interpretable. Survey the railroad features associated with the Winslow logging era and evaluate the opportunities for an interpretive trail. Develop a cadre of volunteers to collect information and make interviews concerning the refuge homesteads. Evaluate the significance of Winslow flat and its potential as an historic interpretive site. Stabilize and maintain structures and landscape features eligible to the National Register of Historic Places. Inventory and identify cultural resources in need of protection or stabilization at a sample of facilities and areas currently subject to high public use, cattle concentration, Air Force activity, and habitat manipulation.

Alternative D

There is no objective for a cultural resources program under Alternative D, beyond basic protection of cultural resources as outlined in section 3.2.2, Features Common to All Alternatives.

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B. Grazing Program

Alternative B

Grazing Objective:

- ***Continue an annual Refuge grazing program where it does not conflict with habitat objectives.*** Specifically,

  1. Allow for optimum growth of riparian and upland vegetation (sedges, shrubs, deciduous trees)
  2. Reduce plant competition to woody species and encourage reestablishment and regeneration of trees and shrubs
  3. Do not exceed 50% use of grasses and forbs
  4. Reduce browsing on woody vegetation
  5. Minimize new fencing and reduce miles of fence on deer winter range. Use electric fencing where feasible. Use fencing specifications that maximize wildlife passage
  6. Reduce stream bank impacts and fecal contamination by designating water access points
  7. Build in flexibility (rest, defer, etc.) to allow for other management tools such as planting, harvest, or fire
  8. Address inholdings either through non-use or compensation to owners
  9. Keep cattle out of campgrounds and lakes

Under Alternative B, the annual grazing program (by permit) would be continued but modified from the existing program to reduce impacts on riparian and other habitats. Grazing of cattle in this Alternative is considered a secondary use that would be allowed where it does not conflict with other wildlife habitat objectives. The number of units and acreage grazed would be reduced by eliminating grazing in alluvial riparian habitats. Grazing would also be concentrated in locations where it may provide improved spring forage to white-tailed deer. This includes those grazing units dominated by herbaceous cover or with grass understory below 3,000 ft. elevation. The assumption is that grazing conditions grasses for late winter and early spring use by deer.

Intensive management (e.g., monitoring and herding) of livestock would be necessary and is more critical than stocking rates (AUMs) or numbers of cows. Season of use would be based on requirements of wildlife, soil, and vegetation. Rotation would be used to rest pastures during regular intervals. Timing of intervals would depend on the vegetative species requirements in each pasture. If necessary, the grazing season could also be shortened to reduce potential for

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grazing of woody vegetation. Permittees would need to monitor stubble height and cattle distribution to avoid concentration and overgrazing of small areas. Cattle would also need to be removed from any specific pasture before they switched from grazing on grasses to browsing on woody vegetation. Refuge staff would also need to devote more time to managing the grazing program to ensure compliance, monitor livestock use, and assist the permittee in determining when to move cattle through units.

Permittees would be selected based on negotiation, competitive bidding, or lottery. Existing permittees who comply with permit requirements may be given the opportunity to meet high bids if competitive bidding is used. Permits would be issued for a one-year period initially. Once the habitat management plan is complete, permits may be issued for a five-year period.

Alternatives C and E

No grazing objective would be adopted under these alternatives. Grazing would be used primarily as a habitat management tool and its use would fall under the umbrella of the benefitting habitat objective.

Alternative D

Under Alternative D, all grazing is phased out on the Refuge and grazing would not be an option as a future management tool. Fences would be removed from the Refuge.

C. Air Force Survival School

Alternative B

Air Force Objective • ***Continue to support an Air Force Survival School program where it does not conflict with habitat objectives.***

Alternative B is the only proposed action alternative that continues use of the Refuge by the Air Force Survival Training program. The training program would be modified to reduce impacts on Refuge wildlife and on the priority recreational activities. The Special Use permit would reduce the time of year training could occur from a current nine month program (January through September) to a two month program, (August and September). This would reduce impacts to wildlife during critical seasons. Use of helicopters and explosives would also be eliminated from the program to further reduce the disturbance these activities cause to wildlife and people. To reduce soil disturbance, the training group size would be reduced to 25 or fewer people and off-road vehicles would be restricted to emergency use only.

Alternatives C, D and E

Under Alternatives C, D, and E, no objective is adopted for the Air Force program, since the program would be phased out within five years of CCP implementation. The five year phase out would allow the program to relocate operations to other public lands that are more suitable with multiple use objectives. These alternatives emphasize that the Air Force Training program is an inappropriate use for a Wildlife Refuge with its primary mission to conserve, manage, and restore fish, wildlife and plant resources and their habitats.

3.4 COMPARISON OF FUNDING AND PERSONNEL NEEDS BY ALTERNATIVE

Because all alternatives must be equally analyzed for implementation, funding considerations must be addressed. The cost to implement each alternative is presented based on typical staff and projects expected for each. Projections are based on normal and predicted budgets. The management activities and projects outlined would be implemented as funds become available. The level of funding required to implement the plan is considered "reasonable" over the next 15 years. However, there may be periods when budgets are lower and it is difficult to obtain funding for even high priority projects. Funding constraints may influence the priority of implementation.

In 1998, the Refuge staff included seven permanent full-time positions (Refuge manager, Refuge operations specialist/fire management officer, wildlife biologist, prescribed fire specialist, maintenance worker, and administrative support specialist) and one vacant permanent full time position (forester). Five other positions are permanent but not full-time. Temporary positions include an engine foreman and firefighters as well as a seasonal four-person Youth Conservation Corps (YCC) crew and crew leader.

Government staffing is usually expressed in units of "full-time equivalents" (FTE). One permanent, full time position represents one FTE. One seasonal position working six months out of the year represents 0.5 FTE

Table 3-2. Comparison of Refuge Staffing under the Alternatives - in FTEs

	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Permanent FTEs	7.8	13.4	13.4	10.6	13.4
Temporary FTEs	4.5	4.5	3.5	2.5	4.0
Total FTEs	12.3	17.9	16.9	13.1	17.4

* volunteer positions not included in staff estimates

Additions to budgets or another funding source would be necessary to support all new forestry, wildlife, maintenance, and portions of administrative positions. Fire management staff and

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portions of administrative support staff salaries would be paid through fire suppression and prescribed fire funds.

Project Summary

Several projects have been identified for implementation in the CCP. (See Appendix C). Funding for these projects varies greatly depending on Congressional appropriations and the Refuge staff's ability to obtain specialty funds from sources such as grants, fire control, flood repairs, mitigation, challenge grants, and road funds. Predicting the actual "nonsalary" funding is difficult. The economic assessment associated with this document was conservative and estimated relatively low nonsalary expenditures. In Alternative A, the $160,482 was based on what occurred in 1998, when the Refuge received flood funds for road repair in addition to other maintenance management dollars. It was a good year for funding. The other alternatives were based on a projection of average budgets and project needs specific to each alternative.

Table 3-3. Estimated Nonsalary Expenditures Used in the Economics Model.

	Alt A.	***Alt. B***	***Alt. C***	***Alt. D***	***Alt. E***
Annual Nonsalary Costs (projects)	$160,482	$121,200	$119,267	$93,733	$124,267

In Appendix C, the project lists represent an operational need associated with implementation of the preferred Alternative E. The figures are substantially higher than what was projected for the economic model Alternative E, in part because of a new funding source for road repairs. The plan identifies the Transportation Equity Act for the 21 Century (TEA-21) as a potential funding source and has added four large road projects to the preferred alternative. With these, the annual nonsalary expenditure for Alternative E is approximately $467,000.

To implement the CCP additional staff and funding would be necessary under most of the alternatives, (however, less staffing would be required under Alternative D). All CCP projects will be included in the Refuge Operating Needs System which is used nationally to budget for Refuge projects.

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Chapter 4: Environmental Consequences

This chapter describes the effects of each alternative presented in Chapter 3. Effects are described in terms of the issues identified in Chapter 1. The evaluation species identified in Chapter 2 are used to represent expected outcomes for wildlife and fish. Management actions expected and analyzed are derived from the alternatives, including the strategies associated with each alternative. Both direct and indirect effects likely to occur over the 15-year life span of the plan are discussed. Also discussed are outcomes that could manifest beyond the plan's 15 years, but would be predicted under actions taken under the CCP.

In the following discussion, the terms "positive", "negative", and "neutral" are used frequently. A "positive effect" means that the action would be favorable over the short or long term to the resources under consideration. A "negative effect" means that the action or set of actions would be detrimental over the short or long term to the health or availability of the resource under consideration. A neutral effect means either a) that there would be no discernable effect, either positive, or negative, on the resources of concern over the time period indicated; or b) that positive and negative effects would both occur and in summary cancel each other out. No change in management practices from the present (as in Alternative A) does not imply neutral effects over time. See each resource for the comparison of effects under different alternatives.

The discussion is organized primarily by resource area, rather than by program area. For instance, forest habitats are discussed, then aquatic habitats, and so on. The analysis attempts to predict the overall impact on these resource areas by integrating the suite of management actions that could occur under any one alternative that might affect this resource. For instance, the lynx discussion considers the effects of roads and recreation, forest habitat management, the likelihood of wildfire, and the effect of the Air Force program.

4.1 EFFECTS TO HABITATS *(Responds to All Issues)*

Effects to Coniferous Forests

Ponderosa pine and Douglas-fir (dry site) forest habitats would be actively managed under Alternatives B, C, D, and E with the use of precommercial and commercial thinning, selective harvest, and prescribed fire. Approximately 1,000 acres per year would be treated, with an overall goal of treating approximately 15,000 acres over the 15-year span of this plan. The long term intent of the treatments under these alternatives is to restore the forest structure and composition to conditions more closely resembling those present in the mid 1880s (Historic Range of Variability) just prior to settlement by American pioneers, homesteaders, and miners.

The forest treatments undertaken, particularly in the ponderosa pine stands, would have the objective of increasing stand vigor, increasing the proportion of mature forest, maintaining or enhancing the presence of mature forest components, and preparing the stands for the reintroduction of low intensity ground fires. This would be accomplished by removing excess

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trees, mostly from age classes less then 70 years. Cut-tree selection in these age classes would be based upon those trees exhibiting poor form, vigor, or that pose a significant risk of disease or insect mortality. Trees aged 125 years or older would largely be left standing to continue to develop. In some instances, older trees would be marked for removal where reduced competition and better spacing would enhance the longevity and vigor of neighboring desirable trees. Since a primary component of mature forests is the presence of defects including broken tops, flattened tops, mistletoe brooms, heartrot, large coarse branches and decay, all of which are important to wildlife, trees with these kinds of defect would be left standing in many cases.

The effect of these treatments would be to reduce the overall tree density, generally favoring the larger, older trees with characteristics favorable to wildlife. Such treatments are considered to be particularly effective at promoting the diameter and height growth of the remaining stand, thus speeding the development of mature and old growth characteristics such as large boles, large limbs and robust canopies (Oliver and Larson, 1990).

Thinning and use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long term, thus lessening the likelihood of a "catastrophic" or lethal fire that could wipe out huge areas. Scientists studying the ecosystems of the Interior Columbia Basin have repeatedly emphasized the importance of restoring natural ecological processes such as regular fire disturbance in this area (Quigley, et. al., 1996). The suppression of natural fire is implicated in several problems widespread across Interior Columbia Basin ecosystems, including severe insect outbreaks and loss of native species diversity.

Treatments in Alternatives B, C, D, and E would begin the process of promoting forest stand development into mature and old stages. These habitats are increasingly scarce at a regional scale (especially in the ponderosa pine stand types) and have important values to native wildlife (Quigley and Cole, 1997). Little Pend Oreille National Wildlife Refuge lies within the Northern Glaciated Mountains Ecological Reporting Unit (ERU), one of six subsets of the Interior Columbia Basin. In this ERU, late seral forest communities have declined by more than 90 percent (Quigley and Arbelbide, 1997). By contributing to the regional recovery of these habitats, under Alternatives B, C, D, and E, the Refuge would establish itself as a firm federal partner in the restoration process.

Specific areas proposed for forest management under Alternatives B, C, D, and E include Starvation Flats, Biarly Flats, and Minnie Flats. Treatments proposed for these pilot projects are presented and analyzed in greater detail in Appendix E. Under these alternatives, other areas, not yet selected, would also be managed with the same objective of promoting the development of late successional characteristics. These other areas would be analyzed in greater detail in the future.

Alternative D would adopt a slightly more conservative approach than Alternatives B, C, or E. Under Alternative D, forest areas that were unlogged in the past would not be commercially thinned or salvaged. The intent would be to allow nature to run its course in the areas that remain the least disturbed on the Refuge. Low impact techniques for fire suppression would be used across the Refuge as much as possible. Benefits to interior forest dwelling and disturbance sensitive wildlife would likely be higher (at least over the short term) than under Alternatives B, C, or E.

Alternative A takes a largely passive management approach, proposing a limited amount of activity, mainly salvage and limited thinning and burning. Wildfires would also be actively suppressed. In this alternative, tree density would remain high and species conversion to shade tolerant types would continue, augmenting problems associated with forest health. This would result in increased fuel loadings, such that over the long term, these conditions would probably make catastrophic wildfire inevitable, despite fire suppression efforts. Forest habitats could be dramatically altered under this alternative, with large expanses converted to shade tolerant trees which would eventually be subject to a lethal fire. Habitats for certain species that rely on mature stands of large trees with open canopies would remain limiting.

Effects to Riparian and Deciduous Forests

Alternatives B, C, D, and E would eliminate livestock grazing completely (Alternative D) or in riparian areas (Alternative B), or use grazing only as an occasional vegetative management tool (Alternatives C and E). The elimination of annual livestock grazing from riparian areas can dramatically speed the vegetative recovery of bare and degraded sites (Clary and Medin, 1990; Ohmart, 1995).

The cattle grazed at the Refuge also preferentially use old homesteads and natural forest openings that have the greatest potential for hardwood forests. Alternative D would exclude cattle from these areas and allow the natural regeneration of deciduous forests in these areas.

Alternatives B, C, D, and E would all reintroduce periodic fire into the landscape, which may have positive benefits to aspen. Other active measures to restore aspen pockets (planting and curtailing of grazing) would also occur under Alternatives B, C, D, and E. These four action alternatives would also each enact programs to plant trees and shrubs in devegetated or degraded riparian areas.

Riparian areas would be protected from road construction and timber harvest by a buffer measuring 200 feet (or greater, depending on the width of the 100-year floodplain) under Alternatives B, C, D, and E.

Some riparian areas on the Refuge are in poor condition due to recreational use. Traditional camping spots adjacent to streams (some located in campgrounds, others dispersed) have caused problems similar to or worse than those apparent with grazing, such as compaction from vehicles and trampling, loss of live riparian vegetation, loss of standing and down dead wood, bank

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erosion, and fecal contamination. Alternative C, which eliminates all Refuge camping, would go the furthest to aid recovery of riparian areas damaged by camping. Dispersed riparian camping would be prohibited under Alternatives B and E, although campgrounds located within the riparian zone would remain. Some riparian camping would remain under Alternative D which allows "no-trace" camping only; though areas accessible by vehicle would be closed. would likely result in little to no riparian camping. Since most campers prefer to locate near water, adoption of any of these alternatives would likely cause an overall reduction in Refuge camping, with attendant benefits to the recovery of riparian vegetation.

Overall, Alternatives D and C would most promote the restoration and development of riparian forests, especially the deciduous riparian forests of the alluvial stream areas that have been strongly affected by grazing.

Alternative A would not adopt any additional measures to restore or protect riparian areas and would keep grazing and camping as at present. This alternative would have a continued negative impact to existing and potential riparian forests.

Effects to Noxious Weeds

Noxious weeds, which mainly inhabit roadsides and open fields at the Refuge, would be controlled with direct method (treatment with integrated pest management) under all alternatives. Integrated pest management is a technique to eliminate unwanted organisms that uses non-chemical methods as well as chemical treatments. Although chemical treatments are often the most effective, they can be risky, leaving poisonous residues in soil and water and often killing many more species than the one targeted. All refuges are limited in what pesticides they can use. Mechanical methods, such as pulling or mowing are labor intensive but safe. Biological methods may involve the release of an insect that feeds exclusively on the offending weed, and is also usually safe.

Alternatives B, C, and D and E treat up to 100 miles of roadside weeds annually. Weeds tend to spread along roads so Alternatives B, C, D, and E will help to check the problem and begin the process of gradually reducing weed coverage on the refuge. In addition these alternatives would treat openings and some forested areas. Alternatives B, C, and E would each treat 250 acres of openings and 250 acres of forested areas. However, under these alternatives a number of openings would also be in cultivation and noxious weeds would be prevented from growing in these areas as well. Alternative D would treat more acres of each type: 350 acres of openings and 350 acres of forested acres.

Alternative A proposes to treat 34 miles of roadside weeds and 12 acres of openings and is clearly inferior to the other alternatives in controlling noxious weed invasions on the Refuge.

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The action alternatives (B, C, D, and E) would also attempt to curb the spread of noxious weeds indirectly, through controls on grazing, and horse use. Domestic animals are thought to act as direct vectors for the spread of noxious weed seeds. Alternatives B and D would regulate equestrian use under the auspices of an equestrian plan, which would require weed-free hay among other stipulations. However, Alternatives C and D, which eliminate horseback riding, would be more effective than the other alternatives in curbing weed introduction and spread.

Alternative D would also eliminate the grazing program and Alternatives C and E would limit grazing to use as a tool for vegetative management. In some cases grazing may be useful as a tool for noxious weed management.

All of the action alternatives incorporate the objective of reducing the extent of noxious weed infestation by half in fifteen years. This goes far beyond Alternative A which sets no objective for weed elimination. Overall, Alternatives C and D would enact the most progressive programs against noxious weeds.

Effects to Rare Plants

To date, limited surveys for rare plants have occurred on the Refuge. Under Alternatives B, C, and E, all known locations inhabited by rare plants would be monitored on a regular basis. Alternatives A and D include provisions for monitoring Ophioglossum pusillum only.

Inventories to find new locations of rare plants are planned under Alternatives B, C, D, and E. These alternatives would better protect Refuge populations of rare plants than Alternative A, because a resource cannot be protected with certainty if its existence is unknown. Protections of known rare plant locations would occur under all alternatives.

Effects to Water Quality

Water quality improvement or deterioration within the Refuge would affect the water quality downstream in the Colville River and ultimately (though insignificantly) the Columbia River). Water quality is influenced by activities near streams that expose soil or affect runoff, such as road construction and maintenance camping, or road maintenance. Water quality is also influenced by activities taking place over the watershed as a whole, such as timber management and prescribed or natural fire.

All alternatives would minimize the construction of new roads. In addition, Alternatives B, C, D, and E each would involve repair of roads that limit fish passage and or cause sedimentation to aquatic habitats, and the planting and stabilizing of devegetated or unstable streambanks. These measures would result in a reduction of direct sediment input to streams. Alternative A proposes no active measures to limit stream sedimentation except by minimizing new road construction.

Alternative B would eliminate grazing within the riparian zones. Riparian grazing would also be effectively discontinued under Alternatives C and E (under these alternatives, grazing would be used only as an occasional vegetation management tool). These restrictions would help to diminish vegetation loss and soil compaction in riparian zones, streambank sloughing and erosion, and fecal contamination of Refuge streams. Alternative D eliminates grazing altogether. Ohmart (1996) demonstrated that riparian recovery may be two to four times faster in ungrazed riparian areas than in riparian areas subjected to managed grazing.

Camping within the riparian zone impacts water quality through compaction, destruction of filtering and buffering riparian vegetation, and through pollutants entering the stream. Water quality in streams, measured by total coliform bacteria counts adjacent to camps, was negatively affected by weekend camp site use that revealed higher coliform counts (Christensen, et. al. 1978). In this western Washington study, bacteria were rapidly transmitted to the river water, even in dry periods. There are no toilets or outhouses to contain human waste at any of the dispersed sites. No dispersed riparian camping would be allowed under Alternatives B, C, and E. Although this rule could be difficult to enforce in all the corners of the Refuge, overall there would likely be an immediate reduction in pollutants and, over time, visible riparian recovery in these former campsites. Compacted sites would have time to heal and would ultimately contribute less sediment laden runoff to streams. Alternative D would accommodate only no-trace camping. Since very little camping would probably continue if Alternative D was adopted, this alternative would also have beneficial effects to water quality. Alternative A would not have these beneficial effects.

Alternatives B, C, D, and E each also propose forest management activities that would possibly involve some soil displacement. During timber harvest and subsequent fuel reduction activities, soil disturbance could result from yarding systems, the fuels reduction methods, and road construction. Forest harvest is also known to increase the magnitude and frequency of peak flows, especially in areas subject to rain-on-snow events (EPA, 1990; Harr and Coffin, 1992). These effects are proportional to the number of acres harvested and the percent of canopy removed. Under Alternatives B, C, D, and E, the Refuge would adopt 200-foot buffers along streams where timber harvest and road construction would generally not occur. This rule would help to keep displaced soil from entering Refuge water systems. However, some short term increases in peak flows with resultant potential effects to channel morphology are possible. In sum, Alternatives B, C, D and E may have a small negative short-term effect on water quality stemming from the upland forest management activities. Over the long term, water quality should be enhanced as a larger percentage of the Refuge develops into mature structural stages.

Over the short term, Alternative A would not result in dramatic degradation or improvement of water quality. However, under this alternative, the Refuge has a higher likelihood of experiencing catastrophic wildfire. Wildfire could cause severe loss of vegetation cover and can increase soil surface water repellency for a short period (Skaugset, 1992). The possible effects of severe wildfire on streams would include high sediment loading, elevated temperatures, and the potential for highly increased peak flows for several years, as well as significant channel morphology changes.

Effects to Aquatic Habitats

Stream sedimentation, high road densities, loss of in-stream large wood, and loss of pool habitat have been cited as key factors involved in fish species declines in the Interior Columbia basin (Quigley, et al., 1996). Based on the discussion above, Alternatives B, C, D, and E would be expected to nave positive long term benefit to aquatic habitats, owing to passive and active measures taken in these alternatives to repair or obliterate eroding roads, replace culverts that block fish passage, restore streambank stability, and increase instream structural complexity.

Hydrologic changes at the Refuge would occur under Alternatives C, D, and E. Alternatives C and E would ensure that flows in the original channels of diverted streams take priority over diversion flows. In a low water year, this could result in positive benefits to stream conditions at the expense of the lake habitats. Since stream and riverine conditions are of concern regionally, and the Refuge is located in a sub-basin considered to have low aquatic and hydrologic integrity (Quigley, et. al., 1996), this is considered to be an overall benefit. Alternative D goes farther, proposing to restore the natural hydrology altogether on the Refuge by breaching the dams and diversions that were built to establish Bayley and McDowell Lakes and Potter's Pond. The lake beds would likely revert to shallow wetland areas. Eliminating the diversions would mean that more water would remain in the main streams, especially during high water runoff seasons (late spring).

Aquatic habitats would realize an additional positive benefit under Alternatives B, C, D, and E, because grazing would be eliminated or conducted outside riparian areas under these alternatives. Cattle trampling and grazing often stunts or kills riparian vegetation, initiating a cycle of root death, soil sloughing, soil compaction, channel widening and downcutting, and stream temperature rise. None of these effects are positive for fish native to the area, so the interruption of this cycle would ultimately benefit fish.

Effects to Air Quality

Known and predictable air quality impacts would result primarily from smoke generated by forestry activities undertaken under Alternatives B, C, D, and E. Temporary impacts to air quality (mainly from particulates) can be expected from the prescribed burning and slash disposal that would occur on up to 1,000 acres each year. Fire effects on air quality fall into three classifications, visibility, particulates, and pollutants. All three classes can affect human health and safety. Both wildfire and prescribed fire can cause impairment of air quality in the above mentioned categories, but prescribed fire can mitigate those impacts through regulations, timing, and techniques of application.

Holsapple and Snell (1996) and Snell (1996) modeled mid-scale modal wildfire and prescribed fire scenarios for the Interior Columbia Basin. They concluded that the prescribed fire scenarios did not cause particulate emissions [in size class ≤ 10 microns] exceeding the EPA standards (40 CFR 50.6). Conversely, all wildfire scenarios exceeded the standard. Similar projections were observed for the standard governing particulate matter ≤ 2.5 microns in size.

Research has demonstrated that by maintaining the flaming stage of combustion during prescribed fires, particulate output is decreased by 50%. The flaming stage of combustion is attained by developing prescriptions which utilize low fuel moistures in all size classes, and by using firing techniques which have low rates of spread, allowing the flaming stage of combustion to maintain itself for the longest period of time within a fuelbed. The best seasons for prescribed fire at Little Pend Oreille NWR in relation to good smoke management conditions (low fuel moistures) are during the late summer and fall. Unfortunately, burning during the dry season also increases the risk of an escaped fire.

If the recommendations for smoke mitigation outlined in the Fire Management Plan (Appendix G) are followed, the impacts from the proposed prescribed fire program should be of relatively short duration and will mainly affect unpopulated areas on the Colville National Forest, east of the Refuge, under prevailing westerly winds.

Large volumes of smoke could be released at any time (normally late summer) if a catastrophic wildfire were to occur, exceeding EPA standards for particulates. Wildfire could occur under any of the alternatives, but is more likely under Alternatives A. This alternative would allow fuel loading to continue and increase unchecked, whereas the other alternatives include plans to thin and underburn stands on approximately 15,000 acres over the life of this plan. Stands receiving this treatment are less likely to ignite or contribute to the spread of large wildfires. Wildfires have the capability to affect air quality not only in the vicinity of the fire, but hundreds of miles downwind. Air quality deterioration during large wildfires can last for weeks or months. These events affect visibility on roads and airports, often requiring closures.

Effects to Selected Species

To simplify and focus the discussion of plan alternative effects on biota inhabiting the Refuge, this analysis centers on the twelve selected evaluation species described in Chapter 2. As discussed in that chapter, these species were selected using an array of criteria and are meant to serve as good representatives of what could happen to the broader set of species inhabiting the Refuge. Because the different management alternatives would result in different habitat conditions, human uses, and disturbance regimes on the Refuge, wildlife and fish and plants are likely to respond accordingly.

The analysis of effects to evaluation species shows that an action may cause a short term deleterious effect while ultimately benefitting the species over the long term. Although the

Comprehensive Conservation Plan is intended to guide management only for the next 15 years, identifying and distinguishing temporary from longer lived effects is important, and management actions taken over the next 15 years can reserve or shut down future management options.

Bald Eagle: Most bald eagle use at the Refuge occurs during winter and along the Little Pend Oreille River. No nesting areas are known to exist. In Oregon and Washington, most nests are located within a half mile of a large water body or large river. It is not known if any of the Refuge lakes are large enough to attract eagles for nesting. As a highly visible species found mainly in association with aquatic habitats, the eagle is more vulnerable than many other species to human disturbance, especially at nest areas (Anthony, et.al., 1992). Bald eagles are particularly intolerant of human disturbance during the breeding season. This sensitivity varies between individuals, but generally adult eagles are more sensitive during courtship, egg-laying, and incubation, with sensitivity decreasing as young develop (Fraser, 1981 *in* USFWS, 1986). Recreational activity can be a major disturbance.

The level of recreational use that would be expected to continue near the lakes under Alternatives A, B, and E during the nesting season would probably preclude the possibility of eagles establishing a nest on the Refuge.

The delay of the fishing opener at the lakes until July 1 under Alternative C, coupled with the elimination of camping, could improve the chance of nest site establishment at McDowell or Bayley Lake.

Foraging habitat for bald eagles could improve slightly under Alternatives B, C, and E, primarily because under these alternatives, improved aquatic habitats could result in healthier fish populations. In addition, forest management actions in these alternatives could produce positive effects on the deer population, which is likely a significant source of winter food. Over the long term, these alternatives would produce a number of suitable nest and roost trees, which are in short supply now.

Alternatives B, C, D, and E would all eliminate low-level helicopter overflights on the Refuge. This policy would benefit the eagle.

Under Alternative D, the eagle could suffer a negative impact due to the loss of the lake habitat, yet since most of their use of the Refuge occurs during winter and along the river, this impact is expected to be small. An offsetting factor in Alternative D which would be expected to benefit the eagle would be the forest management actions (which could accelerate the development of nest trees) and the overall reduction in human disturbances. Overall Alternative D would have a neutral effect.

The combination of positive and negative effects to the eagle under Alternatives B, D, and E result in overall neutral effects under these alternatives.

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Alternative A would be expected to result in a negative impact to bald eagles, due to the continuing degradation of riparian and aquatic habitats, loss of streamside vegetation, absence of active management to promote the development of large nest or roost trees, the continuation of helicopter overflights by the Air Force within proximity of potential or occupied roost trees, and unregulated recreational uses in areas of potential bald eagle habitat.

Overall, Alternative C would be expected to have an overall positive effect on bald eagles, while the other action alternatives would have a neutral effect.

Lynx. This feline predator should benefit primarily from actions that would reduce or eliminate human disturbance and access into its habitats, especially during winter, and from actions that would promote or maintain the specific habitat needs necessary for this species to den and find adequate food (Koehler and Aubrey, 1994). The cold forests that represent potential habitat for the lynx (see Map 6) are currently the most fragmented areas on the refuge. The current checkerboard pattern of inholdings reduces the value of this habitat, both from the perspective of the roads that permeate this habitat, and the limited ability of the Refuge to manage a contiguous area consistently for the lynx.

Alternatives B, C, D, and E would each adopt an objective to strive (over the long term) for vegetative structural conditions approximating the Historic Range of Variability within cold forests, as well as dry and moist forests. Historically, cold forests (which comprise the greater part of lynx habitat on the Refuge) were characteristically mosaics comprised of approximately 25% early seral forest stands, 50% mid seral stands and ~20% late seral stands (USDA and USDI, 1996). Such a mosaic provided lynx with an ideal access to both foraging habitat (early seral stands) and denning habitat (late seral stands), along with plenty of travel habitat (mid seral stands). None of these alternatives would make a great deal of progress towards achieving the HRV over the life of this plan, (for instance, there are no plans to produce early successional forests over the next 15 years), but there would be plans to provide a range of successional forest habitats over the long term. Surrounding federal and private lands will likely provide sufficient quantities of early successional forest over the next fifteen years.

Alternatives B, C, D, and E each include forest management actions to promote the development of late successional characteristics on forest lands. To the extent that these actions occur in high elevation lynx habitat, these actions would benefit the lynx, which relies on late successional forests with large downed woody debris to provide denning sites with security and thermal cover for kittens. These sites are typically located in lodgepole pine, subalpine fir or Engelmann spruce stands older than 200 years (Koehler, 1990).

Alternatives B, C, D, and E would also provide benefit by implementing road closures on all but the county maintained roads between January 1 and April 15, a critical time for lynx.

In addition, Alternatives B, C, D, and E all eliminate snowmobile use on the Refuge. Although this strategy will require increase law enforcement patrols, it would clearly benefit lynx. Snowmobiles cause detrimental impact to this species through noise disturbance as well as by packing snow on roads, which then enables competitor carnivores such as coyote and bobcat to enter lynx habitat (USFWS, 1998).

Under Alternative A, conditions for the lynx would be expected to continue to deteriorate. More visitors would arrive at the Refuge, road density and use would remain unregulated, human disturbances from recreationists and the Air Force would remain moderate to high and little to no forest management actions would be undertaken. Overall, adoption of Alternative A would represent a negative impact to the lynx.

Overall, Alternative D would be expected to have the most benefit to lynx, since this alternative limits human access to the Refuge to the greatest extent, avoids roading and harvest in unlogged stands, eliminates Air Force training use, and reduces camping significantly.

Columbia Spotted Frog. Although more tolerant of warm-water conditions than many other Northwest aquatic species, the Columbia spotted frog appears vulnerable to disruption of water levels (especially while eggs are developing), introduction of non-native aquatic species, loss of riparian cover, and use of chemicals near aquatic zones (Nordstrom and Milner, 1997). Based on these factors, Alternatives B, C, D, and E, which include measures to eliminate grazing in riparian areas and measures to restore streamside vegetation, would result in positive benefits for the spotted frog.

Alternative D would be likely to have the most positive benefit of the alternatives because it also eliminates fish stocking and restores the natural hydrology of the lakes. The lake beds would likely revert to shallow wetland areas, supporting more shallow water species such as wading birds and amphibians, but fewer deep water aquatic species. Fish stocking (especially in historically fishless montane lakes) and the spread of exotic predators such as bullfrog have been implicated in the decline of numerous native amphibian species across the West (Hectnar and M'Closkey, 1997; Drost and Fellers, 1996); native amphibians become prey for the stocked fish and eventually are extirpated. It is not known to what degree historic stocking in the Little Pend Oreille River and Bear Creek has affected populations of this species on the Refuge.

Under Alternative A, habitat conditions for the spotted frog would possibly deteriorate and would not improve. Similar levels of grazing would mean that riparian conditions would continue to degrade in certain areas. Fish stocking would continue. Overall, this alternative would have a neutral to slightly negative effect on the frog.

Northern Goshawk. This species utilizes dense forests across its range, typically choosing stands with the largest trees, on north-facing slopes near water for nesting (Reynolds, 1982). Statistically, the proportion of the landscape surrounding the nest with mid to large sized trees and high levels of crown closure is positively correlated with nest site location and success (Desimone, 1997; McGrath, 1997). Forest management activities (thinning and prescribed fire) will occur within potential goshawk habitat under alternatives B, C, D, and E. Forest management has the potential to cause short-term deleterious effects to goshawks through removal of canopy closure. Depending upon the prescription, thinning and/or prescribed fire may temporarily reduce canopy closures below levels that support goshawk territories. (USFWS, 1998).

Disturbance impacts are not well understood. Goshawks are known to maintain high site fidelity to their territories, not particular nest sites (USFWS, 1998). A pair may maintain up to five alternate nest sites in a single territory. Anecdotal evidence abounds that goshawks exhibit very high tenacity to their nest sites once young have hatched. However, since very few nests are located by surveyors during the courtship and incubation phase, it is not known whether human disturbance of goshawks during the early part of the breeding season is more harmful than later on, displacing birds unbeknownst to biologists (Woodbridge, pers. comm.).

To mitigate disturbance and habitat impacts to goshawks, a combination of distance buffers and seasonal restrictions would be applied where forest management activities are undertaken near known nest sites under Alternatives B, C, D, and E.

Alternatives B, C, D, and E would all be expected to have (over the long term) a positive effect on goshawks, since the forest treatments identified in these alternatives would provide for a greater abundance of large trees (and in some areas, multistoried canopies may develop as a result of thinning and underburning). Over the short term, there could be some negative impacts to goshawks as forests are thinned.

Alternative A would be expected to have a neutral effect on the goshawk. No proactive measures would be taken to improve nesting opportunities on the Refuge, but foraging habitat would continue to be available.

MacGillivray's warbler: The MacGillivray's warbler represents passerine migrants that utilize woodland riparian and aspen habitats. The Little Pend Oreille NWR is in the center of the bird's breeding range, where it inhabits dense thickets (especially riparian willow and alder stands), the edges of mixed conifer woodlands, dry brushy hillsides near water, fire swept or cut-over areas and aspen stands (Ehrlich et. al., 1988; Towry, 1984; Thomas et. al., 1979). They both feed and reproduce in stands ranging in age from shrub-sapling (0-10 years) through mature (<160 years) (Thomas et al 1979), and is a common nester in moist shrubby stands where it builds its nest 1 to 6 feet above the ground, usually between upright stems of saplings or shrubs (Towry, 1984, Thomas et al. 1979). Food consists of insects gleaned from foliage or off the ground in these same habitats. It is an uncommon cowbird host (Ehrlich et. al., 1988).

Planting trees and shrubs in riparian areas as proposed in Alternatives B, C, D and E should have a positive effect by increasing the amount of woody shrub habitat available. Many of these riparian sites are vegetatively degraded due to many years of annual livestock grazing. The elimination of livestock grazing refuge wide (Alternative D), or in riparian areas (Alternative B), or only using grazing an occasional vegetation management tool (Alternatives C and E), should have a significant positive impact on habitat quality for MacGillivray's warbler and other wildlife species using riparian sites by speeding the recovery of these degraded areas. The potential decrease in the number of cowbirds infesting the refuge expected with the decrease or total elimination of cattle grazing proposed under Alternatives B, C, D, and E will likely have very little effect on nesting success of MacGillivray's warbler.

Traditional camping sites next to streams have resulted in the loss of live riparian vegetation. The total elimination of camping on the refuge (Alternative C), or the elimination of dispersed recreational camping in riparian areas (Alternatives B and E) should result in the recovery of vegetation in these camping sites. Implementation of Alternative D would likely result in little to no riparian camping, with a similar positive result.

Measures to restore and encourage aspen copses, such as prescribed fire, tree planting and curtailing grazing, would occur under all action alternatives. These actions should also result in positive benefits for this species.

Under Alternatives B, C, D, E, riparian areas would be protected from road construction and timber harvest by either a 200 foot buffer (or greater, depending on the width of the 100 year flood plain). Adoption of this standard should protect these areas from the pre-commercial and commercial thinning of nearby upland sites proposed under all the action alternatives. This thinning, when combined with the prescribed fire also proposed in the alternatives, should encourage shrub growth, further enhancing habitat quality for this warbler.

Alternative A would not adopt any additional measures to restore or protect riparian areas, nor include the increased use of prescribed fire, while maintaining livestock grazing and camping at present levels. Therefore, this alternative would have a continued negative impact on MacGillivray's warbler.

Common Goldeneye: This species represents waterfowl that utilize the Refuge lakes and streams. Three Refuge lakes were created by humans, but provide some valuable deepwater habitat for waterfowl. Nesting habitat is limited at Bayley Lake, but exists at Potter's Pond and McDowell Lake and possibly at other Refuge lakes.

Refuge waterfowl may be impacted by current levels of recreational activity, especially fishing and camping. Camping and other human uses disproportionately impact riparian areas on the Refuge and likely disturb or disrupt nesting or foraging goldeneyes and other species of waterfowl (DeLong and Schmidt, 1998). The curtailment or elimination of dispersed riparian camping under Alternatives B, C, D and E would benefit the goldeneye. However, campgrounds adjacent to Refuge lakes would remain open under Alternatives A, B and E.

Alternative D would eliminate much of the lacustrine habitat on the Refuge, by breeching dams and diversions. Under this alternative, about 115 acres of goldeneye habitat would be reduced.

Overall, Alternative C would be likely to result in a positive benefit to the common goldeneye, partly because camping restrictions may be most easily enforced under this alternative, but also because this alternative delays the fishing season till after July 1 so as to reduce disturbances to nesting waterfowl.

Alternatives A, B, and E are expected to have a negative effect on goldeneye since human disturbances at Refuge lakes (with the exception of eliminating dispersed camping) would remain at similar levels to those existing currently.

Flammulated owl. An associate of low to mid elevation mature ponderosa pine forests (Marshall, et.al., 1996), this insectivorous owl benefits from actions that promote the development of large diameter ponderosa pines (for nesting) and a multilayered and relatively open canopy (for foraging) interspersed with dense thickets (for roosting) (Hayward and Verner, 1994). Goggans (1986) found these owls nesting in trees averaging 22 inches in diameter (DBH) (though trees as small as 17 inches DBH were also used). Bull et. al. (1990) found that nest trees averaged 28 inches DBH (plus or minus 5 inches). This owl frequently nests in abandoned pileated woodpecker cavities. Habitat for this species is quite limited over its historic range, and it's quite likely that the Refuge currently contains almost no suitable habitat for this species. Because of the forest restoration efforts planned in low elevation forests under Alternatives B, C, D, and E, these alternatives would have a long-term positive effect on this species. No negative short term effects are expected since forest management actions are not planned in any habitats that are currently suitable for this species. Alternative A, which does not adopt forest restoration measures, would be expected to have a slightly negative effect on the owl.

White-tailed Deer: Although deer are often considered "generalist" species, their habitats can be negatively affected by management practices that do not take their particular needs into account. As elevational migrants, they need access to security cover and accessible, nutritious forage during the winter months. Healthy browse located under a snow-intercepting canopy is critical during periods of heavy snow. Decades of fire suppression have taken their toll on woody browse species. Cattle compete with deer for the browse resource, especially in late summer. During spring green-up and fawning, succulent forage (often located in moist meadows and riparian zones) is often chosen, but once again, under current management, the supply is shared with cattle. Under current grazing guidelines, there is little assurance that the cattle grazing supports and enhances the production of forage for deer, rather than depleting it.

Alternative D eliminates grazing, and would eliminate the competition between these two groups for the forage resource.

Alternatives B, C, D, and E each propose the reintroduction of low intensity fire in dry forest habitats. Underburning under the right conditions can stimulate sprouting and regeneration of browse species such as bitterbrush, thus benefitting the winter range habitats of the white-tailed deer. Low intensity fire is more likely to stimulate sprouting while high intensity fire may stimulate seed germination (USDA, 1998). Other browse species such as ceanothus could have similar responses to underburning.

Fields remaining from historic patterns of settlement currently provide rich sources of late winter/early spring forage for deer, with the smallest fields providing forage in close proximity to secure cover. Alternatives B, C, and E each propose maintaining up to 400 acres of this habitat, with grasses maintained through cattle grazing, mowing, or fire (Alternative B) or mowing or prescribed fire (Alternatives C and E). In addition, Alternatives B, C, and E would maintain 200 acres as openings planted to crops for the benefit of wintering white-tailed deer.

Alternative A would allow grazing where it occurs presently (65% of the Refuge's open habitats are grazed). Under Alternative A, a greater number of acres would be available in grass forage, but competition between cattle and deer would slightly diminish the quantity and quality of forage available to the deer, and little would be done to slow the spread of noxious weeds. Aggressive integrated interventions to suppress noxious weeds in the fields would be undertaken in Alternatives B, C, D, and E.

Thirty-five miles of interior fencing, an impediment to wildlife passage that occasionally causes deer mortality, would be removed under Alternatives C, D, and E.

Deer are also impacted by human disturbance. The consequences of disturbance can range from short-term increases in energy expenditures, to displacement from desirable feeding locations, to direct or indirect mortality (Knight and Cole, 1991). Noise and people presence is especially troubling during winter, when fleeing from humans costs the deer energetically, especially during deep snow conditions. If weakened during a time when metabolic expenditures are high, indirect mortality could result. Disturbing agents in past winters have included Air Force personnel, who tend to be widely dispersed throughout the central portion of the Refuge (overlapping winter range). They may use snowmobiles or off-road vehicles during the course of their winter training. Recreational snowmobilers are also a concern, especially those that illegally travel off roads. Cross-country skiers, sledding and snowshoers also likely contribute to wintertime disturbance to deer.

During spring and summer, Air Force helicopters are another source of disturbance, especially during low level flights and landings. Use of old fields for landing zones occasionally displaces deer from these sites. Air Force use of simulated explosives also disrupt deer.

Direct mortality occurs during the fall deer hunt. Approximately 110 bucks and a small number of additional anterless deer are killed each fall at the Refuge during the state seasons (USFWS, 1989). Air Force personnel are also allowed to take deer in order to practice survival skills. Approximately 2 or fewer deer are taken per year.

The cumulative effect of these practices is a moderate to high level of disturbance. Because of these negative impacts under current management, Alternative A is considered to be poor for deer.

Some additional early and late season deer hunts could potentially be offered at the Refuge under Alternatives C and E. Though these hunts would increase hunting disturbance somewhat over current levels, the intent is that these remain "quality" hunts, with a limited number of permits issued.

Alternatives C, D, and E would eliminate all disturbances associated with the Air Force and Alternative B would reduce the level of Air Force disturbance by eliminating wintertime use, limiting the number of Air Force personnel, and curtailing helicopter and off-road vehicle use.

Alternatives B, C, E, and especially D, would ensure road density levels remain at or below the standard recommended for big game. Enacting these closures would significantly reduce disturbance to deer, especially in the winter, when only the two county maintained roads would be open between January and April. This action could also reduce incidental poaching.

Although all of the action alternatives would benefit deer, overall, deer would probably be best served under Alternative C.

Pileated woodpecker: The pileated woodpecker is associated with older, dense forests, but also utilizes younger forests with dead or dying trees or mature/old-growth remnant trees and occasionally can be seen in openings with woody residues. The species requires an abundance of down logs and snags for foraging and prefers large diameter logs and trees for feeding due to their higher insect abundance. In northeast Oregon, they are located primarily in stands with greater than 60% crown closure and often with multilayered canopies (Bull and Holthausen, 1993). These researchers recommended increasing the density of snags for nesting and foraging and increasing the density of downed logs in foraging areas. They also recommended that pileated woodpecker management areas on public lands be maintained with at least 60 percent canopy closure.

Alternatives B, C, D, and E would be expected to benefit the pileated woodpecker over the long term because the forest restoration efforts that are included in these alternatives would be expected to produce a higher density of large trees and snags that these woodpeckers use for feeding, roosting and nesting. Over the short term, these alternatives could have a negative impact, for the same reasons as described for the northern goshawk. Both species rely on mature forests with scattered to numerous large trees and a high degree of canopy closure. The action alternatives would result in some loss of this type of cover with the thinning that is planned.

Alternative A would likely have a neutral effect. Without prescribed fire, the forest habitats would continue to grow more crowded and there would likely be more snags developing in forested areas over the short to mid term under this alternatives. However, the snags would mainly represent feeding opportunities; few would be large enough to support nesting.

Rainbow Trout: The species present on the Refuge includes introgressed forms of the native redband rainbow and the stocked coastal rainbow in streams. Lakes contain only the stocked coastal form. Although the introduced forms of coastal rainbow trout are considered more adaptable to habitat disturbance and alterations than other salmonids (Quigley and Arbelbide, 1997, p 1238), current practices of livestock grazing in riparian areas potentially limit their populations. Behnke and Raleigh (1978) found a three to four-fold decrease in the trout biomass in grazed versus ungrazed areas. Fish population increases have been documented after removal of livestock grazing by Hunter (1991), Amour, et.al (1991) and Platts (1991). Changes in the livestock grazing program proposed under Alternatives B, C, D, and E would all be expected to have a positive effect on this species. The riparian and stream restoration efforts undertaken under Alternatives B, C, D, and E would also aid the trout.

Alternative D would potentially provide the largest benefit to the native redband rainbow, since stocking of all fish would cease under this alternative. Stocking does only occur in the lakes, but a small potential occurs for stocked fish to spill over into streams during high water (Shuhda, pers. comm.). Although it is highly unlikely ceasing stocking would cause the river fish to revert back to the "pure" and distinct native strains, ceasing stocking would at least have the benefit of not further polluting the gene pool. Strategies under Alternatives B, C, and E would include ceasing stocking of the eastern brook trout, but stocking of coastal rainbow would continue.

Under Alternatives B, C, and E, the Refuge would attempt to promote natural spawning at the lakes. Under Alternative D, the lakes would be eliminated. However at this time limited spawning occurs at the lakes, so the lakes do not currently represent a habitat asset so much as a fishing opportunity.

Catch and release fishing on the Little Pend Oreille River would be implemented under Alternatives C and E. This would probably result in a higher likelihood of natural spawning and larger fish in the rivers.

Alternative A would be expected to result in a negative effect on rainbow trout since stream degradation from grazing, camping, and roads would continue. Populations may remain stable, perhaps more due to stocking than to habitat improvement factors, but habitat conditions for wild self-sustaining populations would remain limiting or deteriorate over time.

Ruffed Grouse: The Habitat Suitability Index model compiled for ruffed grouse (Cade and Sousa 1984), determined winter food and spring to fall cover as being the two limiting factors most affecting the species. Therefore, the impact of the proposed alternatives on these two life requisites will be evaluated to determine their effect on this species.

Implementing Alternative A includes allow livestock grazing at approximately the current stocking level. Livestock would continue to browse the aspen, retarding both the expansion and development of more desirable multi-aged stands. The relatively limited amount of thinning activity and prescribed fire treatment (when compared to the other alternatives) coupled with total fire suppression, would also limit the disturbance stimuli needed by aspen to encourage sprouting. Alternative A would continue to allow unregulated camping. The majority of these camping sites are in riparian habitats, reducing or eliminating their value as high quality grouse habitat. Finally, Alternative A would not restore riparian areas. Under this alternative, grouse populations would be expected to remain stable or gradually decrease.

Alternative B would eliminate grazing in low-gradient alluvial riparian areas. Removing livestock browsing pressure in this area of high aspen density will have a substantial positive effect on the quantity and quality of existing and future grouse habitat.

Natural forest structure and composition will be restored with this alternative. This would include managing aspen stands. Thinning, as well as the increased use of prescribed fire, will also stimulate aspen and improve its value as habitat, while removing some of the competing conifers. Alternative B would eliminate dispersed camping and restore riparian areas, having a positive affect on the amount and quality of ruffed grouse habitat available.

Implementing either Alternative C or E will have equal effects on ruffed grouse habitat and populations as they both phase out livestock grazing on the Refuge within 5 years. Grazing would remain only as a specific habitat management tool used in limited situations. Alternative C eliminates all Refuge camping, while Alternative E allows camping in designated campgrounds, but eliminates dispersed riparian camping. Both alternatives will have about the same positive impact on grouse habitat. Alternatives B, C, and E include actions such as thinning, increased use of prescribed fire, and riparian restoration. However, since Alternative C and E also include a cessation of domestic livestock grazing, these alternatives will have a substantially greater positive impact on ruffed grouse habitat than Alternative B.

Alternative D will have effects very similar to Alternatives C and E. All three eliminate livestock grazing and riparian camping, restore natural forest structure through thinning and prescribed fire, and plant and stabilize stream banks. Theses actions will have positive impacts on grouse habitat.

Hoary Bat: This species is a foliage-roosting bat closely associated with late successional forests for roosting. The species is not very maneuverable during flight; they require tall trees with foliage sufficiently high above the ground to enable them to drop far and rapidly, thus gaining momentum to fly (USDA, 1994). The species relies mainly on trees for roosts (caves and mines may also be used occasionally) and shows differential roost heights for clusters of females and young (high in the canopy) while males and non-breeding females roost in the lower canopy (Christy and West, 1993). Perkins and Cross (1988), working in western Oregon, found that the species appears to prefer roost sites in low-mid elevation forest older than 200 years. This species commonly feeds along forest edges, roads, or open areas within the forest, while flying high over the water or ground surface (up to 50 meters; Christy and West, 1993). Riparian areas, which attract many more small flying insects than forested areas, are used heavily by bats for foraging. Protecting this habitat value is important. Hayes et. al. (1995) found that logged riparian areas supported 4-7 times fewer bats than unlogged riparian areas.

As a user of contrasting habitats, the hoary bat represents those species that rely on the simultaneous maintenance of several components of Refuge habitat. This species may realize more benefits from the fields that have been maintained on the Little Pend Oreille than most other native species; yet it would also likely benefit from actions to improve the distribution of riparian forests and actions to promote mature and late successional forests. Alternatives B, C, and E would be expected to positively benefit the species, primarily due to actions promoting late successional characteristics in forested habitats (considered best for roosting), the actions to restore riparian habitats, and the maintenance of some fields as openings.

Alternative D would be expected to have a neutral effect on this species because it enhances roosting habitat and some foraging habitat in riparian areas, but all fields would also be allowed to revert back to forest. Alternative A would also likely have a neutral effect because it maintains fields as foraging habitats but does nothing to promote roosting habitat.

Effects to Cultural Resources

Effects to cultural resources are discussed by alternative below. The variables within each of the alternatives that are most positive for cultural resources are those that reduce or eliminate activities and access on the Refuge. Many activities such as hunting, fishing, noxious weed control, and recreation have virtually no potential to affect cultural resources and are perceived as having a "neutral" affect. Cultural resources are sensitive to ground disturbing types of activities. Potentially negative impacts to cultural resources include logging, concentrated grazing on historic farmsteads, construction of new trails or facilities, and in-filling the open fields of the homestead landscape. Treatment of fire has both positive and negative consequences. Suppressing fires can protect log buildings and archaeological sites, yet the suppression techniques are sometimes more damaging than the fire itself.

In most cases, the cultural resource values of the Little Pend Oreille NWR will be treated according to the regulations of Section 106 of the National Historic Preservation Act (NHPA). Therefore, determining whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that will occur within the planning stages of every project. For instance, the landscape values of the homesteading era would be inventoried and documented in order to determine if any important "historic agricultural landscape features" remain prior to the action of re-vegetation.

Under Alternative A, as is currently the procedure, each project developed by the Refuge that is considered to be an "undertaking" as per the National Historic Preservation Act (NHPA) is reviewed by the FWS, Region 1, Cultural Resources Team. The steps for complying with the NHPA are articulated in Section 106. This process requires survey, reporting, and consultation for each project that has the potential to affect historic properties. Therefore, projects such as forest management salvage or thinning activities are required to meet the Section 106 regulations prior to logging in order to protect any important historic sites.

Alternative B would have a neutral to positive effect on cultural resources. The riparian and stream management, noxious weed management, livestock grazing, entrances and roads, Air Force survival school, hunting, fishing, equestrian, and camping programs would all remain essentially the same as the current program or would be only slightly modified. Therefore, the net effect of these programs is neutral. Changes in programs that would have a positive effect on cultural resources include maintaining 200 acres of openings, closing off a few entrances and roads, and eliminating off-road vehicles. Changes that could have a negative effect on cultural resources include forest management techniques that include harvest and thinning and control of wildfires, and revegetating old farm fields. The lack of any interpretive program that might promote the understanding of cultural resources is also viewed as a negative effect to cultural resources. This alternative also includes provisions to enact a proactive cultural resources program, which will be very positive for cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation

Alternative C is similar to Alternative B except for some modifications that make this alternative generally more positive toward cultural resources. The riparian and stream management, noxious weed management, livestock grazing, roads and entrances, hunting, and fishing programs are all essentially the same as the current program or are only slightly modified. Therefore, the net effect of these programs is neutral. Positive changes in programs include the elimination of the Air Force survival school, camping, horseback riding, and off-road vehicles, and closing off roads and entrances. Maintaining 200 acres of openings, developing wildlife viewing in some fields, and developing an interpretive program that includes natural and cultural history are very positive aspects of this alternative. Timber harvest, fire suppression, and revegetation of fields are viewed as potentially negative to cultural resources. This alternative also includes provisions to enact a proactive cultural resources program, which will be very positive for cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation.

Generally, Alternative D has a positive affect on preserving cultural resource values. Limiting access to 4 entrances and closing roads will lessen the opportunity for vandalism of archaeological sites. Elimination of the Air Force survival school, grazing, and horseback riding will lessen the threats to historic sites posed by these activities. Closing off camp grounds and promoting "no trace" camping will have a neutral affect on cultural resources. Hunting, fishing, riparian management, noxious weed management, and recreation will have no affect on cultural resources and are viewed as "neutral." Forest management (thinning) and rehabilitation of farm fields have potential to disturb cultural resources. All projects that include a ground disturbing element would be reviewed under Section 106 of the NHPA prior to implementation.

Alternative E includes both positive and negative affects to cultural resources. Reducing the training school, closing selected roads, and modifying or eliminating the grazing program will be positive steps toward resource protection. Developing interpretive programs will be very beneficial for cultural resources, especially for interpreting the homestead landscape. This alternative also includes provisions to enact a proactive cultural resources program, which will be very positive for cultural resources.

Activities that have a neutral affect on cultural resources are the current fishing strategies, noxious weed management, and camping in designated campgrounds. Repairing roads for fish passage will require compliance with Section 106, but no known sites would be affected.

The management strategy for old fields is both positive and negative. Maintaining 200 acres as openings that coincide with homestead parcels could enhance the recognition of this type of cultural resource. But, the revegetation of all other remaining open fields indicates a loss of this landscape as well. Forest management practices including thinning and selective harvest will require compliance with Section 106. Meeting the equestrian constituency needs might require the construction of new trails, corrals, and overnight camping areas. Any new development would need to comply with Section 106 of the NHPA. Fire suppression can have both a positive and negative affect on cultural resources. Fire suppression can be positive by protecting the remains of the log homestead cabins on the Refuge. The process of fire suppression can have negative results if new roads, firelines, and fire camps are constructed while combating the fire. Often the damage caused by a bulldozer while cutting a fire line is worse than the fire itself on an archaeological site. Close coordination between the fire crew and a cultural resource specialist familiar with the Little Pend Oreille NWR is necessary during fire suppression efforts.

4.2 EFFECTS TO PUBLIC ACCESS AND RECREATION OPPORTUNITIES *(Responds to Issue # 2)*

Effects to Public Access

The Refuge would have more controlled access under all alternatives except Alternative A. Alternatives B, C, and E would maintain an intermediate level of public access with eight maintained entrances; Alternative D would close all but four entrances. Seasonal road closures to reduce disturbance and harassment would also be implemented under Alternatives B, C, D, and E. Under Alternatives B, C, and E, road density would be kept below 1.5 miles per square mile between April 16-December 30, and below 0.5 miles per square mile between January 1 - April 15. Alternative D would adopt a stricter road density standard of 1.0 miles per square mile during summer. In addition, under Alternative D, portions of the eastern Refuge would no longer be publicly accessible by vehicle.

Road closures or obliterations would be determined under the subsequent Road Management Plan. Criteria leading to closure would consider levels of public or management use and potential for resource degradation. Criteria that would be used to select roads for closure are described in Chapter 2.

The reduced access under Alternatives B, C, and E may have a slight effect on public use, but this effect is expected to be negligible because most Refuge users utilize the eight entrances that would be maintained. The largest effect to public use would probably occur during winter, when seasonal closures would eliminate access to all but the county maintained roads (Buffalo-Wilson Rd., Bear Creek Rd. to Headquarters and Narcisse Creek. Rd.) and Olson Creek Rd. from January 1-April 15. The impact would be larger under Alternative D; reducing public access and use is the tradeoff for providing larger disturbance-free areas for wildlife at the Refuge.

Users who prefer foot or non-motorized travel to vehicle travel (for instance some photographers, hunters, and joggers) would doubtless find the road density policies under the action alternative to increase their opportunities for solitude and recreation free from vehicular disturbance.

Effects to Recreation Opportunities

General: Outdoor recreational use of public lands is on the increase nationwide, and, with the population growth in Stevens County and Spokane, the Little Pend Oreille NWR can probably expect increased visitation in the next ten years, even if an alternative is chosen that limits traditional uses of the Refuge such as camping. To a large extent the alternatives are designed to differentially channel human activities on the Refuge; each alternative strikes a different balance between the goal of meeting public demand for wildlife-dependent recreational opportunities and the goal of maintaining and restoring wildlife populations and habitats. The following is a summary of the management actions related to recreation under the different alternatives.

Alternative A maintains the status quo.

Alternative B continues hunting as at present, endeavors to increase spawning habitat, limits dispersed riparian and winter camping, and seeks to reduce impacts associated with horseback riding activity.

Alternative C eliminates camping and horseback riding, endeavors to increase spawning habitat, promotes catch and release fishing at Bayley Lake and the Little Pend Oreille River, and restricts the fishing season on the lakes, builds an environmental education program, promotes wildlife viewing, expands quality hunting opportunities and introduces new seasons for game birds and big game.

Alternative D eliminates most forms of camping, eliminates horseback riding and restricts hunting of predators and would modify the fishing opportunities through lake changes and elimination of fish stocking.

Alternative E limits dispersed camping and camping during winter, promotes catch and release fishing, endeavors to expand natural fish spawning, builds an environmental education program, promotes wildlife viewing, expands quality hunting opportunities, introduces new seasons for game birds and big game, and seeks to reduce impacts associated with horseback riding activity.

However, human response to management actions is inherently complex. For example, hunting and fishing activities are affected not only by the seasons offered, but also by changes in camping regulations, management of fish and game populations, and the availability of similar opportunities nearby. The analysis below attempts to better predict the ultimate effects to recreation opportunities by looking at these intertwining factors.

Under all action alternatives, many recreational activities would be reigned in or regulated in one form or another. All proposals to reduce or restrict recreational opportunities could cause increased pressure on other nearby public (or private) lands, particularly the Colville National Forest and Washington State Department of Natural Resources lands to the north, where numerous recreational opportunities exist. The extent of this displacement is difficult to predict at this time, though it is likely that users would seek recreation sites at similar distances from the major local population centers (Colville, Chewelah, Spokane) and that offer similar experiences (primitive campsites, lake fishing, etc.).

Hunting. Alternatives C and E could expand Refuge hunting opportunities, specifically offering the state seasons for spring turkey and grouse, and deer and elk bow hunts. By eliminating Air Force use of the Refuge under Alternatives C, D, and E, a larger area could also be made available for hunting during fall seasons.

Hunting may increase under Alternative C even though camping restrictions would make it a day use only opportunity. Deer populations may be higher and more large bucks may be present due to enhancement of winter range habitat and greater use of road closures, and therefore, hunters may experience greater satisfaction as well as greater opportunity.

Alternative D would restrict Refuge hunting somewhat, specifically limiting bear, cougar, coyote, and bobcat hunts. Additional road closures under Alternative D, and encouragement of no-trace camping as opposed to vehicular based camping, would mean that quality big game hunts with greater isolation may be most readily available under this alternative. As in Alternative C, habitat enhancements may also increase deer populations. Waterfowl hunting would likely diminish, as lake habitat would be reduced.

Hunting seasons would remain the same as at present under Alternatives A and B; some restrictions on camping would occur under Alternative B but these would probably negligibly affect hunting opportunities. Game and waterfowl could become less prevalent under Alternative A, due to the combined effects of disturbance from roads, unregulated camping, Air Force use, and lack of habitat management.

Fishing. Overall, the elimination and strong restrictions on camping under Alternatives C and D would probably result in far fewer visitors fishing at the Refuge under these alternatives. This could increase the quality of fishing, with larger fish in streams. However, under Alternative D, the dams maintaining Bayley and McDowell Lakes would be breached, and these areas would revert to seasonally moist wetlands. In addition, stocking would cease.

Alternatives C and E would promote catch and release fishing on the Little Pend Oreille River, which, together with the riparian and aquatic restoration measures included in these alternatives, may increase riverine fishing opportunities. Under Alternative C, lake fishing would be de-emphasized, since the season would be delayed on lakes till July 1.

Alternatives B, C, and E all seek to increase opportunities for natural spawning at the lakes. If effective, this strategy would decrease reliance on stocked fish, possibly resulting in an increase in the average size of caught fish, and promote fish wariness, overall leading to a higher quality fishing experience.

Alternatives A, B, and E continue the fishing seasons as they presently exist on the Refuge. Overall, fishing opportunity at the Refuge may be greatest under Alternatives B and E.

Wildlife Viewing, Interpretation, Environmental Education, and Photography. It is not known to what extent visitors combine wildlife observation and photography with other activities at the Refuge such as camping, fishing, and hunting. However, people who exclusively come to the Refuge to view and photograph wildlife may be deterred to some extent by hunting, snowmobiling, Air Force overflights, and other noisy, disturbing activities. Thus it can probably be inferred that opportunities for these non-consumptive activities increase as these human disturbances decrease. Overall, Alternative D would probably result in the least disturbance on the Refuge. On the other hand, wintertime road closures under all of the action alternatives would limit vehicular access and thus increase potential viewing opportunities for certain publics. For those willing to walk, snowshoe, or ski, viewing opportunities could be greatly enhanced during winter under Alternatives B, C, E, and especially Alternative D.

Alternatives C and E would emphasize visitor education and create both viewing areas and programs. Delaying the fishing opener under Alternative C could greatly enhance viewing and photography opportunities at McDowell and Bayley Lakes and Potter's Pond, although too large an increase in non-consumptive recreation could disturb waterfowl (with subsequent impacts to viewing opportunity) as well as fishing (Klein, 1993). Away from wetlands, wildlife may not be more easily viewed under Alternative C and E than under any of the other alternatives, yet visitor enjoyment may be increased by the additional interpretive information and programs available.

Camping: Camping opportunities would be curtailed under Alternatives C, D, and E, and, to some extent, B. Under Alternative C, camping would no longer be allowed. Alternative D would allow primitive (no-trace) camping in areas that vehicles cannot access; all vehicle accessible camps and campgrounds would be closed and restored to a natural condition. Dispersed riparian camping would be stopped under Alternatives B and E; these two alternatives would also permit camping only in certain designated campgrounds and dispersed sites during specific times of year. Alternative A would allow camping to continue in a largely unregulated fashion. Restrictions on camping may be difficult to enforce without an active education and law enforcement effort. Alternative B would allow some Air Force camping use to continue.

Other recreational activities. With the exception of horseback riding and all-terrain-vehicle use, most other recreational activities (including dog sledding, cross-country skiing, snow sledding, mountain biking, and others) would be allowed to continue as at present under all alternatives until and unless these uses become incompatible with Refuge goals and purposes. Horseback riding would be eliminated under Alternatives C and D. Alternatives B and E could maintain or even increase horseback riding, but it would occur under the auspices of an equestrian plan that would deal with such issues as overnight use, trails, and horse feed.

Dirt bikes and unlicenced all-terrain vehicles would be prohibited from operating on the Refuge under all alternatives. Licenced all-terrain vehicles would only be allowed on designated roads. Snowmobile use would be eliminated under Alternatives B, C, D, and E.

4.3 EFFECTS TO REGIONAL ECONOMY *(Responds to Issue 5)*

Refuge Management Economics

Under the No-Action Alternative (Alternative A), annual Refuge salary expenditures (including salaries and benefits) would be $428,800, and nonsalary expenditures would be $276,500 (Table 4-2). IMPLAN modeling results indicate that Refuge management would result in 8.2 jobs and $589,000 in personal income in the nonmilitary federal government sector. These results differ from the information obtained directly from the Refuge planning process, which indicates that Refuge staffing would account for a total of 15 jobs and $429,000 in salaries and benefits. Similar discrepancies occurred in modeling the other alternatives. Discrepancies between the IMPLAN modeling results and the information obtained directly from Refuge planning are primarily attributable to the low average annual income of seasonal Refuge employees relative to the average income of nonmilitary federal employees in Stevens County. Including direct, indirect, and induced effects, Refuge management would account for an estimated 12 jobs and $704,000 in annual personal income in the region (Table 4-3).

Salary expenditures would increase under all of the action alternatives, and would be greatest under Alternative B (Table 4-2). Nonsalary expenditures would decrease under all of the action alternatives, and would be smallest under Alternative D (Table 4-2). The total regional employment and personal income effects of Refuge management would be greatest under Alternatives B and E (Table 4-3). They would be smallest under Alternative D.

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Table 4-2. Annual Refuge Salary and Nonsalary Expenditures
(in Dollars) by Planning Alternative

	Alternative				
	A	B	C	D	E
Salary					
Permanent, full time	350,000	505,600	477,600	420,000	533,600
Temporary	78,800	111,600	89,000	14,000	100,300
Subtotal	428,800	617,200	566,600	434,000	633,900
Nonsalary	160,482	121,200	119,267	93,733	124,267
Total	589,282	738,400	685,867	527,733	758,167

Forest Products Economics

Under Alternative A, 50-250 thousand board feet (MBF) would be harvested annually on the Little Pend Oreille NWR, consistent with recent harvesting levels and patterns. Under Alternatives B, C, and E, 100-1,000 MBF would be harvested annually, mostly through commercial thinnings designed to remove excess small trees from the forest understory. Under Alternative D, 250-500 MBF would be harvested annually.

Employment and income effects under the action alternatives would increase relative to Alternative A in proportion to the annual harvest level (Table 4-3). Assuming that an average of 150 MBF is harvested annually under Alternative A, it is estimated that Refuge timber sales would account for a total of 0.3 jobs and $20,000 in personal income in the regional forest products industry. Total effects of Alternative A on employment and personal income are estimated at 0.6 jobs and $33,000 per year, respectively. Results shown in Table 4-3 are calculated based on the assumption that an average of 375 MBF would be harvested annually under Alternative D, and that an average of 550 MBF would be harvested annually under Alternatives B, C, and E. Under the action alternatives, the direct and total effects of Refuge timber harvesting would increase in proportion to the harvest level.

Refuge forest management activities other than commercial timber harvesting include precommercial thinning, prescribed burning, and planting of trees in old fields. These activities are usually conducted by Refuge staff, rather than by private contractors. Their economic impacts are accounted for as part of Refuge management.

Table 4-3. Regional Economic Effects of Refuge Activities by Sector and Planning Alternative

Sector and Type of Effect	A	B	C	D	E
Refuge Management					
Direct effects					
Employment (jobs)	8.2	10.2	9.5	7.3	10.5
Personal income ($/year)	589,000	737,000	684,000	524,000	760,000
Total effects					
Employment (jobs)	12.0	15.0	14.0	10.7	15.5
Personal income ($/year)	704,000	880,000	817,000	647,000	909,000
Forest Products					
Direct effects					
Employment (jobs)	0.3	1.1	1.1	0.8	1.1
Personal income ($/year)	20,000	73,000	73,000	50,000	73,000
Total effects					
Employment (jobs)	0.6	2.4	2.4	1.6	2.4
Personal income ($/year)	33,000	125,000	125,000	86,000	125,000
Livestock Production					
Direct effects					
Employment (jobs)	1.9	0.8	0	0	0
Personal income ($/year)	59,000	24,000	0	0	0
Total effects					
Employment (jobs)	3.0	1.2	0	0	0
Personal income ($/year)	96,000	38,000	0	0	0
Recreation					
Direct effects					
Employment (jobs)	16.5	16.5	12.4	11.9	16.3
Personal income ($/year)	327,000	327,000	245,000	235,000	324,000
Total effects					
Employment (jobs)	25.8	25.8	19.4	18.6	25.5
Personal income ($/year)	612,000	612,000	459,000	441,000	606,000
Net economic value ($/year)	1,167,000	1,167,000	872,000	809,000	1,175,000
Aggregate effects					
Direct effects					
Employment (jobs)	26.9	28.6	23.0	20.0	27.9
Personal income ($/year)	995,000	1,161,000	1,002,000	809,000	1,157,000
Total effects					
Employment (jobs)	45.4	44.4	35.8	30.9	43.4
Personal income ($/year)	1,445,000	1,655,000	1,401,000	1,174,000	1,640,000
Net economic value ($/year)	1,167,000	1,167,000	872,000	809,000	1,175,000

Livestock Production Economics

This analysis was based on the assumptions that regional calf sales would change in proportion to the change in Refuge forage supplied to the 4 livestock permittees, and that calves are sold when they weigh an average of 600 pounds. Under Alternative A, forage to support approximately 750 AUMs would continue to be sold to local permittees, and it was assumed that this level of forage sales would support the annual sale of 180 calves, for a total sales weight of 108,000 pounds (1,080 hundred weight).

Under Alternative B, grazing would be restricted to low-elevation upland forest areas, which provide approximately 300 AUMs during the grazing season. Under Alternatives C, D, and E, livestock grazing would be phased out over the next 5 years, except for incidental grazing (under Alternatives C and E only) to achieve wildlife objectives. For this analysis, it was assumed that no forage would be sold to permittees under Alternatives C, D, and E.

Employment and personal income effects of the Refuge grazing program under the planning alternatives are shown in 4-3. Under Alternative A, Refuge forage supply would account for an estimated 1.9 jobs and $62,000 in personal income in the range-fed cattle industry, and a total of 3.0 jobs and $96,000 in personal income throughout the regional economy. Under the other alternatives, direct and total employment and income effects of grazing would decline in proportion to the amount of forage sold on the Refuge.

Eliminating Refuge grazing would increase production costs for the affected permittees, and could result in herd reductions for one or more permittees. For example, if no alternative forage sources were available, permittees could be forced to reduce their herd sizes by the number of head grazed on the Refuge. Under a worst-case scenario, such herd reductions could reduce the size of the permittee's overall operation below the minimum size needed for a cow-calf operation to be viable. In this case, phasing-out of Refuge grazing could result in the closure of one or more local cattle operations, and could lead to a reduction in regional calf sales by more than the approximately 180 head annually produced on the Refuge.

The availability of leasable private rangeland holdings large enough to accommodate a permittee's herd has historically been limited because most local ranch owners allocate their forage to their own cattle operations. Although private rangeland is available for leasing, most holdings are too small to support herds as large as those grazed on the Refuge. The availability of large holdings has declined in recent years as a result of ranch subdivisions for homesite development associated with Stevens County's growing population (Gillaspe and Madson pers. comms.). Although permittees could divide their herds among multiple private pastures, doing so would substantially increase the hauling costs and labor requirements of their operations.

The number of livestock permitted by the Colville National Forest, the region's largest public forage provider, is expected to decline gradually in response to resource protection measures associated with the federal listing of the bull trout, and because of the loss of transitional pastures resulting from declining levels of clearcutting (Ridlington pers. comm.). As a result, competition for available forage is likely to increase.

Opportunities to obtain alternative forage supplies also depend on the overall profitability of livestock operations. Cattle-production profit margins have narrowed in recent years as cattle prices have declined by nearly 50% from their previous peak levels (Hammel pers. comm.). In summary, few, if any, economically viable alternatives to Refuge grazing appear to be available to the permittees.

Other Refuge activities related to cattle grazing include construction, maintenance, and removal of fences. These activities are usually conducted by the grazing permittees, who are compensated for major work by deducting their labor costs from grazing fees.

Recreation Economics

Consistent with historical trends, total recreation use on the Refuge is projected to increase over time under the No-Action Alternative (Table 4-2). Under Alternative B, participation rates would increase as fast as under Alternative A. Under Alternative C, hunting and wildlife and nature observation would increase faster than under Alternative A, fishing use would remain constant, and other types of use (primarily camping and horseback riding) would be eliminated. Under Alternative D, hunting use would increase relatively slowly, wildlife and nature observation would increase relatively rapidly, and fishing and other uses would decline substantially over the next five years. Under Alternative E, hunting and fishing use would increase slightly faster than under Alternative A, while wildlife and nature observation and other uses would increase slightly slower (Table 4-2)

Economic effects of recreation were analyzed based on projected Refuge use levels in 2003. Under Alternatives A and B, Refuge recreation use would account for an estimated 16.5 jobs and $327,000 in personal income in the directly affected industries (i.e., food stores, service stations, restaurants, miscellaneous retail, and lodging places) in 2003 (Table 4-3). Including direct, indirect, and induced effects, recreation use would account for 25.8 jobs and $612,000 in personal income. Under Alternative E, recreation-related economic effects would be roughly the same as under the No-Action Alternative (Table 4-3). Under Alternatives C and D, the employment and income effects of all Refuge recreation would be approximately three-fourths as large as under the No-Action Alternative.

In addition to employment and personal income, Refuge recreation use results in net economic value to users reflecting the amount they would be willing to pay to visit in excess of the amount they would actually pay. Based on the per-day net economic values discussed in Chapter 4 under "Recreation", Refuge use in 2003 under Alternatives A, B, and E would produce a total net economic value of approximately $1.17 million (Table 4-3). Net economic value would be roughly $872,000 under Alternative C and $809,000 under Alternative D.

Air Force Training Economics

Under Alternatives B and E, use of the Refuge by the Air Force Survival School would be reduced. Under Alternatives C and D, it would be phased out over the next 5 years. Because of the small level of regional expenditures related to Air Force training on the Refuge, however, the regional economic impacts of reducing or phasing out this program would be negligible.

Economics Summary

Employment

Under the No-Action Alternative, economic activity directly related to all Refuge operations would account for an estimated 26.9 jobs. Including direct, indirect, and indirect effects, all Refuge operations would account for 45.4 jobs. Among the other alternatives, Alternative B would result in the greatest employment effects, while Alternative D would result in the smallest employment effects (Table 4-3). Refuge recreation use would account for the greatest employment effects, followed by Refuge management. Employment effects associated with timber harvesting and forage production would be relatively small.

Departures of employment effects from their levels under the No-Action Alternative are shown for each of the action alternatives in Table 4-4. Relative to the No-Action Alternative, Alternatives B and E would result in a net increase in employment, while Alternatives C and D would result in a net decrease.

Personal Income

Under the No-Action Alternative, all Refuge operations would directly account for an estimated annual personal income of $995,000; the direct, indirect, and induced effects on personal income would total $1.44 million. Among the other alternatives, both direct and total personal income effects of Refuge operations would increase under Alternatives B and E, and would be reduced and under Alternative D (Table 4-3). Under Alternative C, direct personal income effects would increase, while the total effects would decrease. As with employment, the income effects of Refuge management and recreation are larger than the income effects of timber harvesting and forage production.

Relative to the No-Action Alternative, aggregate personal income would increase under Alternatives B and E and would decrease under Alternative D (Table 4-4). Alternative C would result in a small direct increase in personal income relative to Alternative A, but a decrease in the total personal-income effect.

Table 4-4. Change in Regional Economic Effects from the No-Action Alternative

Sector and Type of Effect	B	C	D	E
Refuge Management				
Direct effects				
Employment (jobs)	2.0	1.3	(0.9)	2.3
Personal income ($/year)	148,000	95,000	(65,000)	(171,000)
Total effects				
Employment (jobs)	3.0	2.0	(1.3)	3.5
Personal income ($/year)	176,000	13,000	(57,000)	205,000
Forest Products				
Direct effects				
Employment (jobs)	0.8	0.8	0.5	0.8
Personal income ($/year)	53,000	53,000	30,000	53,000
Total effects				
Employment (jobs)	1.8	1.8	1.0	1.8
Personal income ($/year)	92,000	92,000	53,000	92,000
Livestock Production				
Direct effects				
Employment (jobs)	(0.9)	(1.9)	(1.9)	(1.9)
Personal income ($/year)	(35,000)	(59,000)	(59,000)	(59,000)
Total effects				
Employment (jobs)	(1.8)	(3.1)	(3.1)	(3.1)
Personal income ($/year)	(58,000)	(96,000)	(96,000)	(96,000)
Recreation				
Direct effects				
Employment (jobs)	0	(4.1)	(4.6)	(0.2)
Personal income ($/year)	0	(82,000)	(92,000)	(3,000)
Total effects				
Employment (jobs)	0	(6.4)	(7.2)	(0.3)
Personal income ($/year)	0	(153,000)	(171,000)	(6,000)
Net economic value ($/year)	0	(295,000)	(358,000)	8,000
Aggregate effects				
Direct effects				
Employment (jobs)	1.9	(3.9)	(6.9)	1.0
Personal income ($/year)	210,000	7,000	(186,000)	162,000
Total effects				
Employment (jobs)	3.0	(5.7)	(10.6)	1.0
Personal income ($/year)	210,000	(144,000)	(271,000)	195,000
Net economic value ($/year)	0	(295,000)	(358,000)	8,000

Net Economic Value

Refuge recreation use would result in consumer's surplus reflecting the amount users are willing to pay to participate above the amount actually spent to participate. Net economic value resulting from recreation use would total approximately $1.17 million per year under Alternatives A, B, and E. Under Alternatives C and D, net economic value would be substantially lower.

Refuge management would probably result in additional consumer's surplus representing, for example, the amount wildlife enthusiasts would be willing to pay to maintain or enhance habitat above the amount actually spent for such activities. The net economic value of wildlife and fish habitat enhancement resulting from the planning alternatives was not estimated for this analysis, however.

4.4 ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898, *Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations*, federal agencies must identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The following discussion addresses environmental justice as related to the land-use alternatives being considered for the Little Pend Oreille NWR. The evaluations considered potential impacts arising under each of the major impact categories evaluated in this EIS, including social and economic, cultural, and physical and biological resources.

Social and Economic Analysis: According to 1990 statistics, the population of Stevens County, where 99% of the Refuge is located, is composed of 93% white and 6% Native Americans. Less than 1% of the population is African, or Asian or Pacific Islander American. People of Hispanic origin of any race account for approximately 1.6% of the community. The population of the County in 1996 was 38,567 and 60% of the population was classified as rural.

The Stevens County economy is dependent on the timber industry, agriculture, manufacturing, mining, trade, and services. Its largest industries are logging, wood and paper products manufacturing, mining, and metal refining. The economics of the area, including jobs and income, may change but not significantly, and no significant change in taxes or revenue from the Refuge is expected. Refer to the Economics sections, Chapters 3 and 4 of this document, for more detailed information.

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Considering social and economic impacts, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are not known to result in disproportionally high and adverse socioeconomic impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

Cultural Resources Analysis: As noted in the Cultural Resource section, use of the area within the boundaries of the Little Pend Oreille NWR by Native Americans is not well documented. In fact, no prehistoric sites have been located within the Refuge itself. There are no treaty reserved Tribal hunting or fishing rights on the Refuge. The Refuge is also not known to provide Tribal traditional uses, such as gathering of foods and medicines, hunting, and pasturing of horses and cattle.

Based on information gathered in the nineteenth century, the Kalispel Indians lived along the eastern boundaries of the Pend Oreille range, around Lake Pend Oreille, Calispel Lake, and along the Pend Oreille River. A population center for the Kalispel was also in the Chewelah area, south of the Refuge. The Colville Indians inhabited the area from Kettle Falls on the Columbia River, south to the Colville Valley. The Spokane Indians were centered around the falls at Spokane. Refer to the Cultural Resources sections, Chapters 3 and 4, for more detailed information.

Considering cultural resources, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are not known to result in disproportionally high and adverse impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

Physical and Biological Analysis: Potential effects to wildlife, fish, and plants, water quality, public access and recreation, special use activities, and air quality are described earlier in this chapter. In analyzing the alternatives potential effects, and considering the areas population, the natural environment, Refuge use and possible health issues, such as herbicide use and smoke management, current uses are not known to cause disproportionately high and adverse human health impacts in any population and no such impacts would be expected to occur as a result of the No-Action or any action alternative. Current uses are also not known to result in disproportionally high and adverse impact to low-income or minority populations and no such impacts would be expected to occur as a result of the No-Action or any action alternative.

In summary, this environmental justice analysis concludes that the socioeconomic, cultural, and physical and biological effects of each alternative do not predict any outcomes that would cause disproportionately high and adverse human health impacts in any population, nor would they result in disproportionally high or adverse impact to low-income or minority populations, nor would any alternative create a greater burden on low-income households.

Effects of Management Changes on Refuge Resources, Programs, and Regional Economy

Table 4-5 illustrates the overall effects to Refuge habitats and species, programs, and the regional economy. An effect is rated positive (+) if the resource would be increased in quantity, quality, or protection. An effect is rated negative (-) if the opposite is true. An effect is rated neutral (N) if there would be no discernable trend towards improvement or deterioration of the resource, or if positive and negative effects cancel each other out. Where short-term and long-term effects differ, they are presented separately.

Table 4-5. Effects of Management Changes on Refuge Resources, Programs, and Regional Economy

Resource	**Anticipated Effect under Alternatives**				
	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Habitats					
Coniferous Forests	-	+	+	+	+
Riparian and Deciduous Forests	-	+	+	+	+
Water Quality - short term	-	-	-	-	-
- long term	-	+	+	+	+
Aquatic Habitats	-	+	+	+	+
Air Quality	-	-	-	-	-
Species					
Noxious Weeds	+	-	-	-	-
Rare Plants	+	+	+	+	+
Bald Eagle	-	N	+	N	N
Canada Lynx	-	+	+	+	+
Columbia Spotted Frog	-	+	+	+	+

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Northern Goshawk - short term	N	-	-	-	-
- long term	N	+	+	+	+
Resource	**Anticipated Effect under Alternatives**				
	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. E**
Flammulated Owl - short term	N	N	N	N	N
long term	-	+	+	+	+
Common Goldeneye	-	-	+	-	-
White-tailed Deer	-	+	+	+	+
Pileated Woodpecker - short term	-	-	-	-	-
- long term	-	+	+	+	+
Rainbow Trout (native)	-	+	+	+	+
Ruffed Grouse	-	+	+	+	+
Hoary Bat	N	+	+	N	+

Other					
Air Force Survival School	N	-	-	-	-
Cultural Resources	N	N/+	+	+	N
Regional Economy **(relative change from No-Action Alternative)**					
Refuge Management		+	+	-	+
Forest Products		+	+	+	+
Livestock		-	-	-	-
Recreation		-	-	-	-
Overall Economic Effect		+	-	-	+

4.5 CUMULATIVE EFFECTS

Potential cumulative effects for all of the alternatives are described below. Such an analysis is intended to consider the interaction of activities at the Little Pend Oreille NWR with other actions occurring over a larger spatial and temporal frame of reference. In addition, the inter-related effects of separate actions under the alternatives are considered.

The problem of overstocked forests extends throughout forested areas on the public lands of Eastern Washington, Eastern Oregon, and Idaho. There is a clear trend on the part of the federal land management agencies, including the USDA Forest Service and the USDI Bureau of Land Management to return regional landscapes to a pattern more closely approximating the historic range of variability. This would involve, among other initiatives, projects to accelerate the development of large trees in forests across the region by thinning from below and widespread use of prescribed fire for the purposes of reducing high fuel loads.

The combination of these region-wide actions (which would also occur at the Little Pend Oreille NWR under action Alternatives B, C, D, and E) could result in three potential cumulative effects.

First, existing air quality is thought to be far superior to that occurring prior to settlement; the improvement is a direct result of the fire suppression. With the simultaneous impetus to subject thousands or millions of acres to prescribed fire, there could be a significant short-term deterioration of air quality caused by burns of excess fuels occurring more or less simultaneously throughout the region (however models show that regionally simultaneous prescribed burning still may not cause degradation severe enough to exceed EPA limits. See Air Quality effects analysis).

In parallel, these simultaneous efforts to restore forest structures and restore the role of fire in ecosystem processes lead us to conclude that a cumulative long-term positive effect for plants and animals dependent on mature and late-successional forests may be anticipated.

Also, regional timber markets may be flooded with small-diameter timber, depressing prices and rendering many of the fuel reduction projects non-viable by commercial operators. This is an example of negative feedback which could diminish or slow the combination of cumulative effects mentioned above. A different cumulative effect could occur as a result of the No-action Alternative. The combination of recreational and Air Force disturbances under Alternative A could cause cumulative impacts to sensitive wildlife.

Finally, Little Pend Oreille NWR is a minor contributor to the regional livestock industry, yet the proposals to reduce or eliminate the grazing program under Alternatives B, C, D, and E could potentially contribute to an already deteriorating situation for the local cattle industry. As discussed earlier in this chapter, the Colville National Forest provides the other major opportunity for grazing on public lands. Given that the Forest is considering a reduction in AUMs for similar reasons, Little Pend Oreille permittees could experience a "squeeze" of cumulative proportions.

4.6 POTENTIAL IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS

The dedication of certain areas to main arterial roads represents an irretrievable loss of natural productivity by the Refuge under all alternatives. Likewise, maintaining campgrounds and campsites (as under Alternatives A, B, D, and E) represents an irreversible diminishment of productivity. Fields would be maintained in varying acres in all alternatives except Alternative D. This would represent an irretrievable loss of native forested habitat value.

Under Alternative A, there would be no attempt to manage excess fuels. Fire suppression would occur under all alternatives, but would be steadfastly practiced under Alternative A. Alternative A would thus result in an irretrievable loss of habitat value for those species requiring an open understory and an overstory dominated by larger, more scattered trees.

Commercial thinning, which would occur under Alternatives B, C, D, and E, as well as salvage, would result in an irretrievable loss of organic material to the soils on certain sites at Little Pend Oreille NWR. Also, fish stocking, which is practiced now and would continue under Alternatives A, B, C, and E, could represent an irretrievably altered species balance in Refuge lakes and rivers.

4.7 RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

All of the action alternatives of this draft Comprehensive Conservation Plan are clearly aimed at enhancing the long-term productivity of the Refuge; that is, enhancing the habitat quality and quantity for native species. Existing uses that have been deemed incompatible (See Appendix F) will be eliminated or modified under the preferred Alternative E. Alternative C, D, and E adopt the most measures to enhance long-term productivity. Alternative B accommodates more existing short term human uses (specifically grazing and the Air Force Survival school), but also enacts sideboards to at least partially mitigate the effects of these uses on the long-term productivity. In summary, all action alternatives improve the enhancement of long-term productivity. The No-Action Alternative would allow long-term productivity to be compromised and further degraded.

4.8 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The preferred alternative (Alternative E) is not expected to result in any unavoidable adverse environmental effects. Habitat and species monitoring that will be undertaken as part of the preferred alternative will enable Refuge staff to adapt management policies to any unforeseen situations.

Chapter 5: Public Involvement, Consultation, and Coordination With Others

5.1 PUBLIC INVOLVEMENT SUMMARY

The following summarizes public outreach including open houses, public meetings, plan work group meetings, camping survey results, planning update mailings, Federal Register notices, and some of the topics discussed or comments received.

Open Houses, Public Meetings

Date and Location of Outreach: July 29, 1995, Open House, at Refuge Headquarters
Purpose: To begin pre-scoping for management planning and hear from visitors what was special or important to them about the refuge
Number of non-FWS Participants: 30
Audience: Public
Topics discussed: road closures, homesteading era, grazing, natural beauty, hunting, fishing, trapping, ORVs, non-motorized recreation, horseback riding, limit Bayley to catch and release only, quality fishing opportunities, search and rescue training, camping, migratory bird sanctuary, phase out snowmobiling, grazing, and hunting

Date and Location of Outreach: October 17, 1995, Meeting, Colville High School, Colville, Washington
Purpose: To initiate public scoping in the planning process
Number of non-FWS Participants: 42
Audience: Public
Topics discussed: special and unique features of the Little Pend Oreille Refuge, draft goals, encroachment of trees in meadows, partnering with public service groups, weeds, hunting predators, cattle and bank erosion along streams, managing fences, natural restoration, loud parties and litter, law enforcement, Air Force conflicts with wildlife and recreationists, Air Force noise, entrances for non-motorized and foot traffic, educational opportunities, gates for horses, monitoring of activities, maintaining diverse uses, safety, horseback riding tradition, hunting closure during Air Force training, road closures, fees for use, field management, fund generation, timber management, wildlife richness in past and off refuge, refuge boundary siting, government intrusions on citizen freedoms, old homestead sites and artifacts, vandalism, volunteers, motorcycle damage to trails, noxious weeds, logging for white-tailed deer, free outdoor recreation, cattle in riparian zones, access by Air Force, restoration and use of old fields, community support, road closures, information signs, off-road vehicles, windfall cleanup, sanitary facilities near water, grooming of trails, cattle control, Air Force road maintenance work, dump station for RVs, old fencing removal, spring repair, organic matter choking lakes, dispersed camping in riparian areas, bank stability, fish stocking, fire control roads, primitive nature of camping, horse hitching posts, and large groups

Date and Location of Outreach: July 29, 1998, Open House at Colville High School, Colville, Washington
Purpose: To present and discuss preliminary alternatives.
Number of non-FWS Participants: 22
Audience: Public
Topics discussed: camping traditions, campsites designation, congestion, hunting restrictions, benefits of weed free hay, photographic documentation of old homesteads, Air Force disturbances to wildlife, grazing modifications, management of old fields, aspen restoration, limits of economic benefits from thinning, weed control, road construction, technologies for forest harvest without roads, map improvements, the return of low-intensity fire, and inholding consolidation

Date and Location of Outreach: July 30, 1998, Open House at Inland Northwest Wildlife Council Headquarters, Spokane, Washington
Purpose: To present and discuss preliminary alternatives.
Number of non-FWS Participants: 17
Audience: Public
Topics discussed: road closures, earth science education, horse presence on trails, camping in the riparian zone, predator trapping, Air Force road maintenance, primitive state of refuge, public access, partnerships with user and friends groups, grazing impacts and benefits, mast for deer and turkey, cropping for wildlife forage, Air Force impacts, natural spawning, white tailed deer, and refuge revenue distribution

Date and Location: August 4, 1998, Meeting, Inland Northwest Wildlife Council Headquarters, Spokane, Washington
Purpose: To present and discuss issues and alternatives for CCP.
Number of non-FWS participants: 60
Audience: Inland Northwest Wildlife Council members
Topics discussed: Air Force hunting closure, camping and hunting, deer management, ORV use

Plan Working Group

In 1997, the Service convened a group of interested persons, a plan work group, representing diverse interests and backgrounds and major stakeholders, to provide feedback to the planning team during the comprehensive conservation planning process.

Name(s)	Representing
John Andrews	Washington Department of Fish and Wildlife
Dan and Evelyn Bell	refuge neighbors, inholding owners, and Safari Club International
Gary Bellinger	horseback riding interests
John Blauser	archery hunting interests
Connie and Gene Cada	refuge grazing permittees and Stevens County Cattlemen's Assoc.

Timothy Coleman	Kettle Range Conservation Group
Ken Elliot	Inland Empire Backcountry Horsemen
Sara Folger	Lands Council
Chuck Gades	Stimson Lumber Company
Bob Gillaspy	Natural Resource Conservation Service
Rick Hatcher	Air Force Survival School
Larry Heming	Inland Empire Backcountry Horsemen
Ron King	Washington Department of Natural Resources
Greg Konkel	Inland Northwest Wildlife Council
Tim Kunka	Stevens County Cattlemen's Association
Dan Len	Colville National Forest
Cena Lotze	Horseback Rider
Beverly McLaughlin	conservationist
George Potter	Inland Empire Fly Fishing Club
Scott Price	wildlife photographer
Dick Rivers	Spokane Audubon Society and Lands Council
Dave Robinson	Kettle Range Conservation Group
Shelly Short	Congressman George Nethercutt's office
Tony Delgado	Stevens County Federal Lands Advisory Committee
Jim Kolthoff	Colville National Forest/Air Force Survival School
Russ Larsen	Stevens County Federal Lands Advisory Committee

Others attending these meetings included Kevin Morrissey, Lello Galassi, and Al Bobst from the Air Force Survival School; Ed Shaw and Chris Loggers from the Colville National Forest; and Steve Zender from Washington Department of Fish and Wildlife. Others invited to participate in this work group included: Duane Scott, Mayor of Colville, WA, Fred Lotze, Stevens County Commissioner; Steve Rumsey; Publisher Open Spaces, Tricounty Recreation Guide; and Rod Fogle, former Colville Chamber of Commerce President.

Date and Location of Outreach: June 30, 1997, meeting, Colville Community Center
Purpose: First in a series of meetings of interested citizens and stakeholders in CCP discussions
Number of non-FWS Participants: 17
Audience: Plan Working Group
Topics discussed: introductions, issues as seen by organizations/people in this group, management of wildfires, logging and white-tailed deer management, grazing, trail and road maintenance funds, equal consideration for all wildlife, historic vegetation conditions, off-refuge wildlife values, Air Force training, effects of commercial uses on wildlife, Interior Columbia Basin Ecosystem Management Project, ecosystem management approach, road maintenance, primacy of wildlife, grazing allotment fencing, quality fishing, wildlife diversity dependence on natural processes, including fire, winter range, risk of fire, budget and staff needed to implement plan, Air Force services to refuge, Air Force conflicts with wildlife, road closures, logging methods and benefits,

logging influence on noxious weeds, human use as related to logging roads, water quality and roads, grazing incompatibility with other uses, elk/cattle conflict, wildlife objectives met by grazing, grazing riparian damage, hunting closure associated with Air Force, helicopter use by Air Force, restorations, core areas for seclusion-dependent species, and inclusion of other interests, others who should be invited to these meetings

Date and Location of Outreach: August 11, 1997, Meeting, Stevens County
Purpose: Second in series of meetings of interested citizens and stakeholders in CCP discussions; preliminary management objectives.
Number of non-FWS Participants: 14
Audience: Plan Working Group
Topics discussed: riparian issues, preliminary management objectives for riparian areas, preliminary management objectives and strategies for public use, riparian survey methodology, and proper functioning condition definition

Date and Location of Outreach: September 29,1997, Meeting, USDA/Stevens County Conservation District Conference Room, Colville
Purpose: Third in a series of meetings of interested citizens and stakeholders in CCP discussions; roads and access, biological workshop summary, alternative development
Number of non-FWS Participants: 22
Audience: Plan Working Group
Topics discussed: passage of NWRS Improvement Act, roads and entrances, weeds, draft vegetation maps, goal statement revisions, summary of September 16-17, 1997, biological workshop, summary of potential management tools being considered, measurable objectives, natural fire regime, timber management, retain management flexibility

Date and Location of Outreach: July 28, 1998, Meeting at Colville National Forest Supervisor's Office Conference Room; Colville, Washington.
Purpose: Fourth in a series of meetings of interested citizens and stakeholders in CCP discussions; discuss preliminary alternatives.
Number of non-FWS Participants: 13
Audience: Plan Working Group
Topics discussed: historic uses, deer depredations on adjacent agriculture lands, native bbiodiversity, grazing AUMs, Air Force, natural disturbances, habitat restoration, road closures, fur trapping, fire program, road rehabilitation, white-tailed deer population fluctuations, stream restoration, weed control, diverse vegetation types on refuge, fish stocking, refuge contributions to local economy, and camping fees

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Camping Survey

Date and Location of Outreach: May-June, 1997, written public use survey at campgrounds at the Refuge
Purpose: To discover public reasons for using the Little Pend Oreille Refuge, and solicit information on public concerns
Number of Responses: 20
Audience: Campers
The responses indicated: 60% of campers came from Spokane area, 15% from Stevens County, and 25% form Western Washington, 35% came to the Refuge primarily to camp, 35% came primarily to fish, and 30% came to the Refuge primarily to view wildlife. Special qualities of the Little Pend Oreille that campers enjoy include: traditional camping area, not many people, good horse country, and enjoy large trout catch and release fishing away from logging.

Planning Updates

Date of Outreach: February, 1996, Mailing of Planning Update # 1
Purpose: To share information gathered from open houses in July and October 1995, present issues to be addressed in the plan, and present potential draft goals.
Number of recipients: 300
Audience: Refuge mailing list

Date of Outreach: April, 1997, Mailing of Planning Update # 2
Purpose: To disseminate results of recent biological inventory findings, share draft management principles and goals, and advise public of upcoming public meetings and workshops
Number of recipients: 400
Audience: Refuge mailing list

Date of Outreach: September, 1997, Mailing of Planning Update # 3
Purpose: To summarize progress on CCP planning; disseminate results of recent biological inventory findings; share draft management strategies for refuge management; and advise public of upcoming public meetings and workshops.
Number of recipients: 400
Audience: Refuge mailing list and refuge visitors

Date of Outreach: July 10, 1998, Mailing of Planning Update # 4
Purpose: To present preliminary alternatives, advise public of upcoming open houses and invite comment on the preliminary alternatives.
Number of recipients: 500
Audience: Refuge mailing list and other interested parties

Comments were received indicating: By December 1, 1998, 141 written responses were received. Comments are too varied and numerous to summarize here, but an overall survey shows public support for the preliminary alternatives as follows: 48 responses in support of Alternative A, 44 responses in support of Alternative B, 4 responses in support of Alternative C, 3 responses in support of Alternative D, 1 response in support of Alternative E, 1 response preferring Alternative A or Alternative B, 28 responses preferring either Alternative B or Alternative C with specific modifications, and 5 responses preferring none of the preliminary alternatives.

Federal Register Notices

Date and Location of Outreach: December 13, 1996, listing in the Federal Register
Purpose: Notice of Intent to Prepare a Comprehensive Management Plan and NEPA document
Audience: National
Notice included: Public notice of initiation of planning process for the Refuge, and solicitation of written suggestions and information.

Date and Location of Outreach: July 24, 1998, listing in the Federal Register
Purpose: Notice of Intent to Prepare a Comprehensive Conservation Plan and EIS
Audience: National
Notice included: Public notice of preliminary alternatives developed for the Little Pend Oreille Comprehensive Conservation Plan, solicitation of written suggestions and information on the alternatives, and announcement of public open house meetings.

5.2 CONSULTATION AND COORDINATION WITH OTHERS

Stevens County

Date and Location: March 7, 1995
Purpose: To brief Commissioners of upcoming planning process.
Number of non-FWS participants: 6
Audience: Stevens County Board of Commissioners
Topics discussed: weed management, grazing, involving Stevens County Federal Land Advisory Committee (FLAC) in plan development

Date and Location: March 16, 1995
Purpose: To inform FLAC members of refuge projects, upcoming planning, endangered species
Number of non-FWS participants: Unknown
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: planning status, refuge policy, FLAC members interested in developing planning process and strategy, weed management

Date and Location: September 21, 1995
Purpose: To brief for FLAC on refuge projects, planning.
Number of non-FWS participants: 7
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: Clearwater Land Exchange proposal, management plan, upcoming public scoping meeting, forest management, fire management, commercial uses of refuge

Date and Location: January 16, 1997
Purpose: To inform FLAC members of refuge projects, planning process.
Number of non-FWS participants: Unknown
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: fishing dock, management plan update, overviews of fish habitat and riparian surveys, upcoming grazing review

Date and Location: March 20, 1997
Purpose: To brief FLAC on refuge projects.
Number of non-FWS participants: 8
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: bull trout listing, grazing, damage on refuge from winter storms, planning update

Date and Location: July 16, 1997
Purpose: To brief FLAC on CCP.
Number of non-FWS participants: 6
Audience: Stevens County Federal Lands Advisory Committee
Topics discussed: comments received on preliminary alternatives, grazing study, Air Force, whether our outreach efforts are reaching interested parties

FWS Orientation

Date and Location: May 23-25, 1995
Purpose: First step in planning process development and served as a field orientation to Fish and Wildlife Service personnel who would be involved in LPO planning.
Number of non-FWS participants: 12
Audience: Participants were invited because either they would have some role in refuge planning (FWS staff), they managed adjacent or other public lands, or have worked on some aspect of LPO management.
Topics discussed: draft goals, field orientation discussion covered: old fields, noxious weeds, historic vegetation and fire history, homesteading history, Bayley Lake, adjacent forest management by FS, leafy spurge, recreational fishing, prescribed burning, Washington GAP report, Air Force training, stream diversions, grazing program, bank stability, fish habitat, logging history, forest management techniques, deer winter range, forest diversity, old growth species, industrial timber inholdings management, forest

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carnivores, snowmobiling, adjacent DNR management, forest fragmentation, riparian habitat condition, desired future of refuge, priorities, and issues. The following sites were visited: Christiansen place Cliff Ridge overlook, Potter's Pond, Bayley Lake, Lenhart Meadows and adjacent unmanaged/unroaded forest, AF Rookery/cedar camp, McDowell Lake overlook, Little Pend Oreille River downstream from Headquarters, Starvation Flat, Lower Manz Field, Blacktail Mountain Cedar hemlock, Plum Creek inholdings, Olson Creek Road sno-park.

Inter-agency review is also being undertaken at this time in compliance with the Endangered Species Act. No significant impact is expected from the implementation of the Proposed Action on threatened, endangered or proposed species.

Grazing Management

Date and Location: October 8, 1997 meeting at USDA/Stevens County Conservation District Office Conference Room, Colville, Washington
Purpose: To discuss specific concerns about refuge grazing program with permittees and potential role of grazing in meeting CCP goals and objectives.
Audience: Refuge permittees and other grazing interests
Number of non-FWS participants: 10
Topics discussed: permittees concerns related to preliminary objectives presented in planning updates and plan work group meetings, role of grazing in meeting objectives, Service grazing policy, riparian restoration, grazing as a tool, intensive management, overstocked forest, permittees preparing a grazing alternative for CCP, fences, competition between cows and ungulates, fish habitat objectives

Air Force Survival School Training

Date and Location: July 7, 1997 meeting at Air Force Survival School Headquarters, Fairchild, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 14
Audience: Air Force Survival School
Topics discussed: discussions about balancing divergent missions of refuge and survival school

Date and Location: April 22, 1998, meeting at Colville Community College, Colville, Washington.
Purpose: To discuss CCP process and concerns regarding Air Force Survival School Training
Number of non-FWS Participants: 5
Audience: Colville National Forest staff
Topics discussed: Air Force survival school training on both administrative units

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Date and Location: July 8, 1998, meeting at Refuge Headquarters, Colville, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 5
Audience: Air Force Survival School
Topics discussed: Air Force survival school training and stipulations to insure compatibility, opening hunting season

Date and Location: December 9, 1998, meeting at Air Force Survival School Headquarters, Fairchild Air Force Base, Washington.
Purpose: To discuss concerns regarding Air Force Survival School Training.
Number of non-FWS Participants: 4
Audience: Air Force Survival School
Topics discussed: preferred alternative for Survival School training, alternate training sites

5.3 ACKNOWLEDGMENTS

Many people have been involved in meetings and discussions related to the future of Little Pend Oreille National Wildlife Refuge. These meetings began in 1995, with an orientation to the refuge for upper management. We thank all of the following individuals for their thoughtful discussions and insight.

In 1997, we convened a group of interested persons, a plan work group, representing diverse interests and backgrounds, to provide feedback to the planning team during the comprehensive conservation planning process. We thank them for their honest feedback.

Plan Work Group

John Andrews (Washington Department of Fish and Wildlife); Dan and Evelyn Bell (refuge neighbors, inholders, and Safari Club International members); Gary Bellinger, (horseback rider); John Blauser (refuge archery hunter); Connie and Gene Cada (refuge grazing permittees and Stevens County Cattlemen's Association); Timothy Coleman, (Kettle Range Conservation Group); Ken Elliot (Inland Empire Backcountry Horsemen); Sara Folger (Lands Council); Chuck Gades (Stimson Lumber Company); Bob Gillaspy (Natural Resource Conservation Service); Rick Hatcher (Air Force Survival School); Larry Heming (Inland Empire Backcountry Horsemen); Ron King (Washington Department of Natural Resources); Greg Konkel (Inland Northwest Wildlife Council); Tim Kunka (Stevens County Cattlemen's Association); Dan Len (Colville National Forest); Cena Lotze (Horseback Rider); Beverly McLaughlin (conservationist); George Potter (Inland Empire Fly Fishing Club); Scott Price (wildlife photographer); Dick Rivers (Spokane Audubon Society and Lands Council); Dave Robinson

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(Kettle Range Conservation Group); Shelly Short (Congressman George Nethercutt's office); Tony Delgado (Stevens County Federal Lands Advisory Council); Jim Kolthoff (Colville National Forest Air Force Survival School liaison); and Russ Larsen (Stevens County Federal Lands Advisory Council). Others attending one of these meetings included Kevin Morrissey, Lello Galassi, and Al Bobst from the Air Force Survival School; Ed Shaw and Chris Loggers from the Colville National Forest; and Steve Zender from Washington Department of Fish and Wildlife.

Fish and Wildlife Service

The employees attended planning meetings and or provided input on draft documents. Howard Browers (wildlife biologist, Upper Columbia Fish and Wildlife Office); Brian Cates (field supervisor, Mid-Columbia Fish and Wildlife Office); Rick Coleman (formerly regional refuge supervisor for Idaho, Oregon, and Washington); Nancy Curry (refuge manager, Turnbull NWR); Michelle Eames (wildlife biologist, Upper Columbia Fish and Wildlife Office); Julie Gillum (regional writer editor); Ben Harrison (regional NEPA coordinator); Chuck Houghten (regional refuge planner); Barb Kelly-Ringel (fisheries biologist, Mid-Columbia Fish and Wildlife Office); Dick Kuehner (regional education, publications and interpretive communications chief); Phil Laumeyer (field supervisor, Upper Columbia Fish and Wildlife Office); Jim Lillie (LPONWR administrative officer); Karl Mallory (maintenance worker/law enforcement officer, LPONWR); Dave Menke (outdoor recreation planner, Klamath NWR Complex); Steve Moore (regional refuge operations chief); Dick Munoz (assistant regional refuge supervisor for Idaho, Oregon, and Washington); Sandy Noble (assistant field supervisor, Mid-Columbia Fish and Wildlife Office); Fred Paveglio (regional biologist); Bill Pyle (biologist, Gray's Lake NWR); Mike Rule (biologist, Turnbull NWR); Lou Ann Speulda (regional archeologist historian); Don Voros (refuge supervisor for Columbia Basin Ecoregion); Tara Zimmerman (regional nongame biologist).

Others providing input during planning meetings include: Dr. Margaret O'Connell, Eastern Washington University, Lt. Col. William Osborne, Chief Carson House, Lt. Col. Steve Childers, SMSgt. Clay Steele from the Air Force Survival School; Jim McGowan, Cindy Len, Julie Richardson, and Carl Damman from the Colville National Forest; Chuck McComb, Washington Department of Fish and Wildlife; Jim Gleaton, Natural Resource Conservation Service; Kevin Ritzer, Bureau of Indian Affairs; Bruce Edmonston, National Park Service; and Phil Dubois, Rick and Roger Larsen, and Andy and Bobbi Kroiss who are refuge grazing permittees.

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Chapter 6: List of Preparers

Name	Contributions	Degree(s)	Years of Experience
U.S. Fish and Wildlife Service Contributors:			
PNW Refuge Planning Team:			
Mike Marxen	Planning Team Leader	BLA Landscape Architecture	20
Kevin Gergely	Writing	MPA Public Policy	11
Helen Hamilton	Writer Editor	BS Wildlife Management	20
Sharon Selvaggio	Wildlife, GIS, Writing	BS Biology MS Energy & Resources	11
Little Pend Oreille NWR:			
Lisa Langelier	Refuge Management, Writing, Public Involvement	BS Wildlife Resources MS Wildlife Resources	17
Jerry Cline	Wildlife and Fisheries, Writing	BS Wildlife MS Wildlife	10
Steve Fowler	Forestry, Fire, Operations, Writing	BS Forestry & Wildlife	20
Regional Office and Field Stations:			
Ron Beitel	Geographic Information Systems Maps	BA Chemistry	22
Don DeLong	Native Habitat, FWS Policy,	BS Wildlife MS Wildlife	10
Matt Hasti	Graphic Design	BS Technical Illustration Graphic Design	9
Barbara Kelly Ringel Leavenworth, WA	Fish, Fish Habitat Surveys, Objectives & Strategy	BA Biology MS Fish & Wildlife Mgnt	11
William Pyle (Grays Lake NWR)	Riparian Habitat Evaluation	BS Wildlife MS Wildlife	10
Lou Ann Speulda	Cultural Resources, History	BS Anthropology & History MS Archeology & History	20
Consultant:			
Nick Dennis Jones and Stokes Associates, Inc	Economics	BS Forestry MS Forestry PhD Forestry & Resource	25

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Appendix A: Glossary

ACRONYMS AND ABBREVIATIONS

AUM - Animal Unit Month
CCP- Comprehensive Conservation Plan
EA - Environmental Assessment
EIS - Environmental Impact Statement
FWS - U.S. Fish and Wildlife Service
Little Pend Oreille, The Refuge - The Little Pend Oreille National Wildlife Refuge
NEPA - National Environmental Policy Act
NWR - National Wildlife Refuge
Refuge Improvement Act, The Act - The National Wildlife Refuge System Improvement Act of 1997
Refuge System - National Wildlife Refuge System
Service - U.S. Fish and Wildlife Service
USDI - United States Department of Interior

TERMS

Adaptive Management. Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alternative. 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (Draft Service Manual 602 FW 1.5).

Animal Unit Month. A measure of the quantity of livestock forage. Equivalent to the amount of forage needed to support a 1,000 pound animal (or 1 cow/calf pair) for 1 month.

Biological Diversity. The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1.12B). The System's focus is on indigenous species, biotic communities and ecological processes. Also referred to as Biodiversity.

Biological Control. The use of organisms or viruses to control weeds or other pests.

Board Foot. A measurement of timber harvest, the amount of timber equivalent to a piece 1 by 1 foot and 1 inch thick (=1/12 cubic foot). MBF is the abbreviation for 1,000 board feet.

Canopy. A layer of foliage, generally the upper-most layer, in a forest stand. Can be used to refer to mid- or understory vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).

Categorical Exclusion (CE, CX, CATEX, CATX). A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR. Code of Federal Regulations.

Class A Noxious Weed. Those noxious weeds not native to the state that are of limited distribution or are unrecorded in the state and that pose a serious threat to the state.

Class B Noxious Weed. Those noxious weeds not native to the state that are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region.

Class B Designate. These are Class B noxious weeds whose populations in a region or area are such that all seed production can be prevented within a calendar year.

Class C Noxious Weed. Any other noxious weed.

Commercial Thinning. A type of timber harvest that removes merchantable material.

Compatible Use. A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Draft Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identified stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan (CCP). A document that describes the desired future conditions of the refuge, and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates (Draft Service Manual 602 FW 1.5).

Concern. See definition of "Issue."

Cord (of Firewood). A unit of wood cut for fuel equal to a stack 4 x 4 x 8 feet or 128 cubic feet.

Cover Type. The present vegetation of an area.

Cultural Resources. The remains of sites, structures, or objects used by people in the past.

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field offices background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Deciduous Pertaining to any plant organ or group of organs that is shed annually; perennial plants that are leafless for sometime during the year.

Depredation Damage inflicted upon agricultural crops or ornamental plants by wildlife.

Demography The quantitative analysis of population structure and trend.

Designated Wilderness Area An area designated by the United States Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).

Disturbance Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., timber harvest).

Down Wood Material All woody material, from whatever source, that is dead and lying on the forest floor.

Early Seral Stage An area that is in the primary stages of ecological succession.

Ecological Succession The orderly progression of an area through time from one vegetative community to another in the absence of disturbance. For example, an area may proceed from grass-forb through aspen forest to mixed-conifer forest.

Ecosystem A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management Management of natural resources using system wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Even-aged Forests Used to refer to forests composed of trees with a time span of less than 20 years between oldest and youngest individuals.

Endangered Species (Federal) A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in Washington within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Endemic Species. Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Environmental Assessment (EA). A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Environmental Impact Statement (EIS). A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

Fauna. All the vertebrate and invertebrate animals of an area.

Federal Trust Resources: A trust is something managed by one entity for another who hold the ownership. The FWS hold in trust many natural resources for the people of the United States of America as a result of Federal Acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a National Wildlife refuge.

Federal Trust Species. All species where the federal government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Fire Regime. A description of the frequency, severity, and extent of fire that typically occurs in an area or vegetative type.

Flora. All the plant species of an area.

Forb. A broadleaved, herbaceous plant; for example, a columbine.

Forest Cover Type. See Vegetation Type.

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Fragmentation. The process of reducing the size and connectivity of habitat patches.

Fuel Load. The amount of combustible material present per unit area.

Goal. Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Geographic Information System (GIS). A computer system capable of storing and manipulating spatial data.

Habitat. Suite of existing environmental condition required by an organism for survival and reproductions. The place where an organism typically lives.

Habitat Type. See Vegetation Type.

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy forestlands, rangelands, and aquatic systems.

Historic Range of Variability (HRV). The natural fluctuation of components of healthy ecosystems over time. In this EIS, HRV refers to the range of conditions and processes that are likely to have occurred prior to settlement of the project area by people of European descent (approximately the mid-1800s), which would have varied within certain limits over time. Historic range of variability is discussed in this document as a reference point to establish a baseline set of conditions for which sufficient scientific or historical information is available to enable comparison to current condition.

Indicator Species. A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species. Also referred to as a key species.

Inholding. Privately owned land inside the boundary of a national refuge.

Informed Consent. The grudging willingness of opponents to "to along" with a course of action that they actually oppose (Bleiker).

Integrated Pest Management. Methods of managing undesirable species, such as weeds, including: education; prevention; physical or mechanical methods of control; biological control; responsible chemical use; and cultural methods.

Issue. Any unsettled matter that requires a management decision; e.g., a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (Draft Service Manual 602 FW 1.5).

Late Seral Stage Forest. A forest in the mature stage of development, usually dominated by large, old trees.

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Lethal fire. A wildland fire that kills the overstory vegetation on a site. For example, a lethal fire in a forest would generally kill the overstory trees, either by crown scorch or by basal injury. A lethal fire in a grass shrub community would kill the overstory of shrubs. Both fires are lethal, but there can be great differences in the actual fire intensity.

Management Alternative. See Alternative.

Management Concern. See Issue.

Management Opportunity. See Issue.

Microhabitat. Habitat features at a fine scale; often identifies a unique set of local habitat features.

Mid-Seral Forest. A forest of mid ages, usually characterized by a closed canopy and diameters of greater than or equal to 8" DBH

Migration. The seasonal movement from one area to another and back.

Mission Statement. Succinct statement of a unit's purpose and reason for being.

Mitigation. Measures designed to counteract environmental impacts or to make impacts less severe.

Mixed Fire. Fires possessing a mosaic of fire intensities which result in intermediate effects that vary across the landscape.

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA). Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (from 40 CFR 1500).

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the System.

National Wildlife Refuge System. Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protections and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, games ranges, wildlife management areas, or waterfowl production areas.

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National Wildlife Refuge System Mission. The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Native Species. Species that normally live and thrive in a particular ecosystem.

Neotropical Migratory Bird. A bird species that breeds north of the U.S.-- Mexican border and winters primarily south of this border.

Non-lethal Fire. Rangeland fires in which vegetation structure and composition, three years following the fire, are similar to pre-burn conditions.

Notice of Intent (NOI). In the case of a federal action, such as analyzed in this documentation, an NOI is a notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the *Federal Register*.

Noxious Weed. A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the Untied States and to the public health.

Objective. An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW 1.5).

Old Multi-story Forest. Forested areas lacking frequent disturbance to understory vegetation. Also referred to as late-successional multi-story, late-seral multi-story, and old forest multi-story.

Old Single-story Forest. Forested areas resulting from frequent non-lethal prescribed or natural underburning, or other management. Also referred to as late-successional single-story, late-seral single-story, and old forest single-story.

Planning Area. A planning area may include lands outside existing planning unit boundaries that are being studied for inclusion in the System and or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.

Planning Team. A planning team prepared the Comprehensive Conservation Plan. Planning teams are interdisciplinary in membership and function. Teams generally consist of a planning ream leader, refuge manager and staff, biologists; staff specialists or other representatives of

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Service programs, ecosystems or regional offices, and other governmental agencies as appropriate

Planning Unit. A single refuge, an ecologically administratively related complex of refuges, or distinct unit of a refuge.

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community. An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site -- such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall, denotes a general kind of climax plant community, i.e.,, ponderosa pine or bunchgrass.

Preferred Alternative. This is the alternative determined [by the decision maker] to best achieve the Refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Prescribed Fire. The skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc., that allow confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of forest management, wildlife management, or hazard reduction.

Prescribed Natural Fire. A fire ignited by natural processes (usually lightning) and allowed to burn within specified parameters of fuels, weather, and topography to achieve specified resource management objectives.

Public. Individuals, organizations, and groups; officials of Federal, State, and local government agencies, Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

Public Involvement. A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public Involvement Plan. Broad long-term guidance for involving the public in the comprehensive planning process.

Purpose(s) of the Refuge. The purpose of a refuge is specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorization, or expanding a refuge, refuge unit, or refuge subunit

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Refuge Operating Needs System (RONS). The Refuge Operating Needs System is a national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans, and meet goals, objectives, and legal mandates.

Refuge Use. Any activity on a refuge, except administrative or law enforcement activity carried out by or under the direction of an authorized Service employee.

Recommended Wilderness. Areas studied and found suitable for wilderness designation by both the Director and Secretary, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).

Record of Decision (ROD). A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Refuge Goal. See Goal.

Refuge Purposes. The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, a refuge unit, or refuge subunit (Draft Service Manual 602 FW 1.5).

Refuge Revenue Sharing. A 1978 Act (Public Law 95-469) which authorizes payments to counties in which Service-owned land is located. The amount of the payment is computed based on things such as the appraised value of Service fee land, number of acres of fee land, and net receipts collected by the Service for certain activities permitted on reserve lands (lands withdrawn from the public domain).

Riparian. Refers to an area or habitat that is transitional from terrestrial to aquatic ecosystems; including streams, lakes wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all plant-life growing on the land adjoining a stream and directly influenced by the stream.

Salvage Harvest. Removal of dead, damaged, or susceptible trees primarily to prevent the spread of pests or pathogens and to promote forest health.

Selective Harvest. A timber cutting method based on removal of individual trees, rather than groups of trees.

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Seral Stage. Any plant community whose plant composition is changing in a predictable way; characterized by a group of species or plant community that will eventually be replaced by a different group of species or plant community, for example, an aspen community changing to a coniferous forest community.

Slash. Debris from trees resulting from felling or from wind or fire.

Snags. Standing dead tree from which the leaves and most of the branches have fallen. Many species of wildlife and some plants rely on snags for food and cover.

Special Status Species. Plants or animals which have been identified through either federal law, state law, or agency policy, as requiring special protection of monitoring. Examples include federally listed endangered, threatened, proposed, or candidate species; state liste endangered, threatened, candidate, or monitor species; U.S. Fish and Wildlife Service species of management concern and species identified by the Partners in flight program as being of extreme or moderately high conservation concern.

Species of Management Interest. Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being federal trust species such as migratory birds, important game species including white-tailed deer, furbearers such as American marten, important prey species including red-backed vole, or significant keystone species such as beaver.

Stand. Any homogenous area of vegetation with more or less uniform soils, land-form, and vegetation. Typically used to refer to forested areas.

Stand Density. The number of trees growing in a given area, usually expressed in terms of trees per acre.

Stand Diversity. The distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single-story), some are two-story, and some are a mix of trees of different ages and sized (multi-story).

Stand Initiation. When land is preoccupied by trees following a stand-replacing disturbance. Also referred to as early-successional, early-seral, and regeneration.

tem Exclusion-open Canopy. Forested areas where the occurrence of new trees is redominantly limited by moisture. Also referred to s mid-successional, mid-seral, and young forest.

tem Exclusion-closed Canopy. Forested areas where the occurrence of new trees is redominantly limited by light. Also referred to as mid-successional, mid-seral, and young forest.

Step-down Management Plans. Step-down management plans provide the details necessary to mplement management strategies identified in the comprehensive conservation plan (Draft Service Manual 602 FW 1.5).

Structural Stage. A description of forests based on the location of the majority of the trees in the diameter distribution of a stand; often described as stages ranging from grass-forb-shrub, seedling/sapling, young forest, mid-aged forest, mature forest, and old forest.

Sound Professional Judgement. A finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the Refuge Administration Act and other applicable laws.

Strategy. A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).

Tiering. The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).

Thinning, Precommercial/Noncommercial. The practice of removing some of the smaller trees in a stand so that remaining trees will grow faster.

Threatened Species (Federal). Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State). A plant or animal species likely to become endangered in Washington within the near future if factors contributing to population decline or habitat degradation or loss continue.

Trust Species. Species for which the U.S. Fish and Wildlife Service has primary responsibility, including, most federally list threatened and endangered species, anadromous fish once they enter inland U.S. waterways, and migratory birds. Also see "Federal Trust Species".

Underburn. A burn by a surface fire that can consume ground vegetation.

Understory. Any vegetation whose canopy (foliage) is below, or closer to the ground than canopies of other plants.

Understory Reinitiation. When a second generation of trees is established under an older, typically seral, overstory. Also referred to as mid-successional, mid-seral, and young forest.

Unit Objective. See Objective.

U.S. Fish and Wildlife Service Mission. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

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Vegetation Type, Habitat Type, Forest Cover Type. A land classification system based upon the concept of distinct plant associations.

Vision Statement. A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific refuge purposes, and other relevant mandates (Draft Service Manual 602 FW 1.5).

Watershed. The region draining into a river, river system, or body of water.

Wilderness Study Areas. Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must beet the following criteria: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation, (3) has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness. See Designated Wilderness Area.

Wildfire. A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire. Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3)

Wildlife Corridor. A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals.. These are transition habitats and need not contain all the habitat elements required for long-tem survival or reproduction of its migrants.

Wildlife-dependent Recreation. A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the System.

Witches Broom. A mass of profuse and densely packed twigs representing abnormal growth of a tree branch. Often results from infection by dwarf mistletoe.

Young Forest Multi-story. Stand development resulting from frequent harvest or lethal disturbance to the overstory. Also referred to as mid-successional, mid-seral, and young forest.

Appendix B. References

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Appendix C. The Preferred Alternative: CCP Objectives, Projects and Implementation Strategies

This appendix, when combined with Chapters 1 and 2, contains key information that will appear in the final Comprehensive Conservation Plan document. Appendix C summarizes the objectives specific to the preferred alternative E; management philosophy and priorities; implementation strategies; inventory and monitoring plans; projects; staffing needs; and opportunities for partnerships in carrying out the Comprehensive Conservation Plan (CCP).

Refuge Purpose

To Conserve Habitats for Migratory Birds and all other Native Fish and Wildlife

Goal 1: *Conserve, enhance, and restore native forest, riparian, in-stream, and wetland habitats representative of the native habitat diversity of Northeastern Washington.*

Goal 2: *Monitor, protect and recover special status plants and animals and species of special concern.*

Goal 3: *Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge wildlife, fish, habitats and cultural history.*

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Draft CCP Objectives Summary

The following draft objectives summarize many of the management decisions proposed for the Little Pend Oreille National Wildlife Refuge. Once finalized, these objectives will become the core guidance statements of the Comprehensive Conservation Plan.

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Dry Forest Stand Structure Objectives:

- *Restore mature stand structures and fire ecosystem role in dry forest stands* on up to 1000 acres per year (or until 90% is under regular fire management). Strive to create open stands dominated by scattered mature pine and larch trees to provide diverse natural habitat for wildlife and to reduce the risk of fire and disease.
- *Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)* within the dry forest zone: ~15 % early seral, ~35 % mid seral, and ~50% old single or old multi-layer (USDA and USDI, 1997, p. 2-56 and 3-32).

Understory Shrub Objective

- *Increase the percent shrub understory cover in mid and late seral stands*; increase shrub crown cover less than five feet in height to 40% or more (applies to forests below 3500 feet).

Moist and Cold Forest Objectives:

- *Protect, restore and maintain the biological integrity and connectivity of the higher elevation forest habitat zones.*
- *Over the long term (100-200 years) aim for a mosaic of stands of different age and structural classes at approximately the same seral distributions as occurred historically (HRV)* within the moist and cold forest zones: ~25 % early seral, ~40 % mid seral, and ~35% old single or old multi-layer (USDA and USDI, 1997, p. 2-56 and 3-32).

Landscape Connectivity Objective:

- *Maintain or establish mature forest connectivity on a landscape scale with adjoining agencies and landowners*

Watershed Partnership Objective:

- *Restore and maintain the health of the Little Pend Oreille River in partnership with the Stevens County Conservation District and various landowners*

Watershed Health Objective:

- *Reduce the effect of roads upon water quality and bank stability.*

Alluvial Riparian Restoration Objectives:

- *Restore 7 miles of unsatisfactory alluvial riparian habitat* along Little Pend Oreille River and Bear Creek, by the year 2015. Re-establish native vegetation and strive to achieve the following characteristics:

  1. a minimum of 80% stable banks with deep-rooted streambank vegetation;
  2. a regular source of large woody debris within 25 feet of the stream banks (available at least every 150 feet of stream length);
  3. a natural mixture of riparian vegetation seral stages including a recruitment source for large trees;
  4. productive (non-weedy) wildlife habitat/native cover in artificial openings

- *Restore mixed-deciduous riparian forest* to their natural distribution within the Refuge and restore the native composition of trees, shrubs, sedges, rushes, grasses and forbs within these plant communities.

Riparian Protection Objective:

- *Protect and maintain riparian habitats from loss of vegetation and soil integrity throughout Refuge.*

Stream Habitat Objectives:

- *Improve stream habitat conditions* for native fish and other aquatic wildlife, specifically aiming to meet or exceed the standards set for stream habitat components in the federal Inland Native Fish Strategy (INFISH) including: pool frequency, water temperature, large woody debris, bank stability, lower bank angle, and width/depth ratio (USDA, 1995). Adopt newer standard when one is approved.

Flow objective:

- *Ensure that flows in the original channels of diverted steams take priority over diversion flows.*

Marsh Maintenance Objective:

- *Maintain or restore at least 100 acres of permanently flooded emergent marsh habitat,* to benefit certain wading birds, ducks and amphibians.

Noxious Weed Objective:

- *Reduce weed seed production from noxious weeds.* Treat 50 roadside miles, 250 acres of openings, and 250 acres of forested habitat each year. Reduce the amount of noxious weed cover on the Refuge by half by the year 2015.

Fields Management Objectives:	• *Maintain approximately 80% of the fields as openings* to provide a diversity of habitat structure, grass and herb forage for herbivores, enhanced wildlife viewing opportunities, and to maintain certain cultural resources.
Native Species Conservation Objective:	• *Emphasize conservation and recovery of native species, with emphasis on special status species and species of management interest.*
Wildlife and Fish Monitoring Objective:	• *Build and maintain a professional wildlife inventory and monitoring program.* Conduct monitoring guided sufficiently by scientific and statistical principles to confidently determine baseline populations, trends, and habitat associations for key Refuge species.
Fishing Opportunity Objective:	• *Provide a range of high quality lake and stream fishing opportunities* to approximately 6000 visitors per year, providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, and an opportunity to use various angling techniques.
Natural Spawning Objective	• *Improve conditions for natural spawning in lakes.*
Hunting Opportunity Objective:	• *Together with the State, expand quality hunting experiences on the Refuge.* This includes providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport, for approximately 10,000 visitors each year.
Viewing, Photography, Env. Ed and Interpretation Objective:	• *Expand opportunities for wildlife viewing, photography, and interpretation.* Explore opportunities for expanding an environmental education program.
Camping Objective:	• *Minimize impacts associated with Refuge dispersed camping, especially along riparian areas and during the sensitive winter and spring/summer periods.* Create a Refuge camping program supportive of Refuge System priority uses.
Horseback	• *Minimize impacts associated with Refuge horseback riding.*

Off-road Vehicles Objective:

- *Minimize disturbance impacts of off-road vehicular uses. Allow legal ATV use on designated roads only. Discontinue all snowmobiling on the Refuge.*

Access Control Objective

- *Designate eight official entrances.*

Open Road Density Objective:

- *Close roads as needed to attain an open road density not exceeding 0.5 miles/square mile during winter and 1.5 miles/square mile during summer.*

Road Minimization Objective

- *Ensure no net increase in the total miles of Refuge roads. No new roads in RNAs or roadless areas.*

Public Access Roads Objective:

- *Employ the following criteria to determine whether roads shall be kept open and maintained for public uses.* (Roads not meeting these criteria may still be necessary in some cases for management purposes; these shall continue to meet basic safety standards.)

1. Traffic has minimal disturbance on wildlife populations.
2. Road has minimal impact on wildlife and fish habitat. (Excessive runoff and sedimentation controlled through proper design and maintenance.)
3. Vehicle access is necessary to support primary wildlife-dependent activities of the Refuge including: wildlife observation, hunting, fishing, wildlife photography, environmental education and interpretation.
4. Road is necessary to provide access to Refuge campground.

5. Roads meet basic safety standards for road type.
6. Funding is available to make periodic improvements and repairs.
7. Traffic does not adversely affect recreational experience of primary activities.

Cultural Resource Objective:

- *Implement a proactive cultural resource management program.*

Wildlife, Fish, and Plant Management Implementation

Management priorities will be established to meet the goals and objectives outlined in the CCP. These priorities are driven by Fish and Wildlife Service trust responsibilities (migratory birds, endangered, threatened, and candidate species), the mission of the refuge system, refuge purposes, unique ecosystem components available on this refuge, and desires of the public. The best science available will be used to measure success or failure in achieving goals and objectives.

Mature and older-aged successional forest communities cannot be grown within the 15 year life of this plan. Therefore, the direction provided by the CCP will set the stage for the future of these communities. There are both proximate and ultimate goals to achieve through the CCP. The proximate goal is to improve habitat conditions while the ultimate goal is to have wildlife communities using these habitats.

Native species and diversity management
Refuge staff will emphasize conservation and recovery of native species, and support natural processes, such as fire and predation. At LPO past management focused on game species, particularly white-tailed deer. In early Refuge years, planting nonnative species such as bitter brush and small burnett was intended to benefit deer. Since white-tailed deer are native to the Refuge and portions of the Refuge provide important wintering areas, the Service will continue to provide deer habitat. Management actions favoring other wildlife, including small mammals, birds, and reptiles, and amphibians will also be taken. Over time, the Refuge hopes to gain a better understanding of all living communities. Invertebrates, fungi, or lichens may provide important habitat conditions for wildlife.

Population control of predators deemed a threat to the deer population was practiced regularly in early Refuge years. Hunting, trapping, and poisoning of mountain lions, coyote, and bobcat were accepted as management tools to protect deer from predation. Feeding deer was viewed as necessary for herd management. While some of these techniques may still be used under specific circumstances, a broader view is now taken concerning habitat potential, species needs, and functional roles and focus our actions on habitat management. Recreational hunting will be used as a game population management tool. Targeted control of predators, rodents or other species may be occasionally necessary to protect human health, protect facilities or to achieve refuge objectives.

In the next 15 years, Refuge management will concentrate on restoring and protecting native plants and animals in terrestrial habitats. Non-native species including elk, wild turkeys, or brook trout may benefit from Refuge habitat management, however, Refuge staff will not actively manage for them or actively manage against them unless their populations are conflicting with native species.

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It is the policy of the Service to prevent further introduction of non-native or exotic species on refuges except where a species would have value as a biological control agent (e.g., to manage noxious weeds) and would be compatible with the Refuge objectives. Management of exotics may be permitted only if eliminating the species is impractical or the species has been established and maintained on a non-augmented basis for at least 25 years and does not conflict with Refuge objectives (7 RM 8.1). Species such as ring-necked pheasant or gray partridge may have been introduced in the past and survived because the type of habitat they require was created through land use changes and settlement. The refuge will not manage for habitat conditions for these or other non native birds.

Non-native undesirable species such as tench will be controlled and eliminated if possible. Tench, a non-native introduced fish species, lives in McDowell Lake and associated wetlands and contributes to lake turbidity and algal blooms. The Refuge will work cooperatively with the WDFW and other interested groups in controlling these undesirable species through trapping, use of rotenone, or using other methods. The method that is most effective and has minimal impact on native fish and wildlife will be favored.

Endangered, threatened, proposed, or candidate species and nongame bird species of management concern

The Refuge will consider reintroducing native wildlife species to the Refuge, when practical or within appropriate recovery zones. Details will be developed in the Population Management step-down plan. The costs and labor of these efforts must be weighed against efforts to retain other species of management concern. The Refuge is located within the designated recovery areas for bald eagle and peregrine falcon. Refuge staff will explore opportunities to participate in the recovery of these species on the Refuge. Every effort will be made to protect and enhance species proposed for listing, such as the Canada lynx, and any candidate species for listing in the future under the Endangered Species Act.

Although the Refuge in not within the USFWS designated recovery area of gray wolf and grizzly bear, its close proximity to these areas make it possible for individuals to occur on the Refuge. If these species are detected on the Refuge, appropriate officials and the public will be notified.

Problem animals

In the past, a few problem animals captured by the WDFW have been released on Refuge. These include black bears or mountain lions wandering into areas where they were endangering themselves or humans. The Refuge will consider the relocation of problem animals on a case by case basis with a ceiling of two large predators per year. Safety of Refuge visitors and resident wildlife will be the deciding factors in relocating problem animals.

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Inventory and Monitoring

Inventory and monitoring of wildlife, fish and plants on the Refuge will be an ongoing program for the life of the CCP. The first questions to answer in preparing to collect any field data is what information is needed and how will the data be used. The next step will be to develop a database design and sampling protocol in consultation with a biostatistician. Completing an inventory and map showing the distribution of vegetation zones and successional stages will be a high priority during the early life of the plan, tapering off as more is learned of Refuge habitats. GAP Analysis of all Washington national wildlife refuges was completed in 1997 (Cassidy et al 1997). An early step in the inventory and monitoring efforts will be to evaluate the species GAP predicts would occur on the Refuge against field data. Since GAP analysis provides a large-scale look at refuge diversity it does not include small areas, less than 240 acres, that may be disproportionately important to wildlife (for example, small wetlands or aspen stands). Questions of scale are important when placing the information gleaned from site specific data into a regional context to understand the conservation value of refuge habitats.

Ideally, monitoring would occur across several levels of biological organization including genetic, population/species, community/ecosystem, and regional landscapes (Noss and Cooperider, 1994). At each level, information would be evaluated for composition, structure and function. This level of monitoring is not practical, at this time. One of the most important aspects of monitoring is that it be integrated with management so that information collected affects future management decisions.

Photopoints and phototransects for prescribed fire monitoring will be repeated before and immediately after burns at one, three, and five year intervals. These same points will be used for vertebrate and vegetation monitoring. Pre and post treatment monitoring of vertebrates and vegetation will occur before and after initial forest and riparian treatments to evaluate whether treatments are having desired affects. This monitoring will be high priority and initially will include: Starvation Flat, Minnie Flat, and Biarly Flat, pre-commercial thinning sites, and alluvial riparian restoration sites along Little Pend Oreille River and Bear Creek. Another high priority for monitoring will be areas with past records or suitable habitats for special species (e.g., higher elevations for Canada lynx, suitable marten habitats and headwater streams for Northern goshawk, etc.). Additional effort will be directed at headwater streams, wetlands, and other small but important habitats for wildlife. Any suitable nesting areas for peregrine falcons will be evaluated. All sightings of special status species will be recorded and mapped. Additional effort will be made starting in 2000 to survey for amphibians and bats. All field staff will be trained in identification of special status species.

Emphasis will be placed on assessing the health of forest and riparian bird communities by monitoring population trends and nesting success in relation to habitat features and vegetative condition. Endangered Species Act listed species (ESA), Species of Management Concern (SMCs), and species identified as conservation priorities by the Partners in Flight (PIF)

Landbirds Conservation Program will be emphasized in both baseline monitoring and pre and post treatment monitoring.

In addition to special status and pre and post treatment monitoring, annual evaluations will be made on harvested species including deer, grouse, and trout. Waterfowl monitoring will be done to understand how recreational fishing may be affecting bird use of lakes. All nesting boxes will be monitored for use regularly. Carnivores will be monitored using track counts and photopoints.

The Refuge will continue to participate and contribute to regional and national avian monitoring programs including the BBS and MAPS. Refuge-specific assessments of forest and riparian avian communities will be addressed using a variety of approaches including 1) stratified point counts, area searches, and target species sampling protocols to assess songbird use, abundance, and diversity; 2) nest monitoring and constant effort mist-netting to evaluate the health of refuge avian communities by assessing key demographic variables; and 3) relating these variables to characteristics of vegetation and habitat conditions to assist in developing habitat management strategies for landbirds conservation. A detailed inventory and monitoring program will be developed by 2005 as part of the step-down habitat management plan.

Initial project descriptions and funding needs for inventory and monitoring include:

Project 1 **Landbird surveys.** Develop and implement a systematic and habitat-based landbirds monitoring program to:

1) Assess the current status of landbirds populations utilizing the NWR;
2) Provide baseline data to necessary to assess the effectiveness of land management and restoration efforts, and:
3) Provide recommendations for the conservation of native landbirds populations and communities in the primary NWR habitat types (riparian, selected upland forest types). Estimated Cost $200,000

Project 2 **Vertebrate survey.** Complete a comprehensive survey of Refuge vertebrates in all five forest vegetation zones and riparian, wetland, and lake habitats. Estimated cost: $200,000 ($100,000 for contract and $100,000 in staff costs).

Project 3 **Studies and Investigations.** Complete pre-treatment and post-treatment habitat and vertebrate monitoring on Starvation Flat, Minnie Flat, and Biarly Flat areas. Estimated cost $200,000 contract and 2 staff).

Habitat Management

The step-down Habitat Management Plan will provide additional detail on the distribution and abundance of existing vegetation types, the historic range of variability, disturbance patterns, composition, structure, successional stages, trends, functional roles, and limiting factors.

Project 4 **Habitat Management Plan**. Inventory and map Refuge habitats and develop a habitat management plan by 2003. Cost includes GIS data development and analysis. Estimated cost: $80,000; 1 Full Time Staff Person for 1 year. (FTE)

Weed Management

Most Refuge habitats harbor non-native plants. Some of these plants occur incidentally but others have a tendency to invade and displace native plants. These plants are referred to as noxious weeds. Noxious weeds are defined by State Law 17.10.010 as any plant which when established is highly destructive, competitive, or difficult to control by cultural or chemical practices. Noxious weeds are one of the most serious threats to wildlife habitats in the western United States

The State and counties maintain weed lists which specify the control requirements for several classes of weeds. Early detection, prevention, and eradication of newly invading noxious weeds is the goal of weed control efforts. At this time there are no known occurrences of Class A weeds on the Refuge. Class B weed control of seed production and prevention of further spread, and in some cases, control of a buffer strip of at least forty feet in width along boundaries with adjoining landowners and along travel corridors. Weeds in this class that occur on the Refuge include leafy spurge, plumeless thistle, and yellow hawkweed. For Class B and C weeds prevention of further spread is priority along boundaries with adjoining landowners and along travel corridors. Weeds in these classes which are known to occur on the Refuge include orange hawkweed, diffuse knapweed, and spotted knapweed.

The Service strives to meet the requirements of State Law 17.10.010 to control all Class A and B-designate weeds and many Class B and C weeds. Weed management occurs along major roadways and in areas of concentrated public use. Chemical, biological, and mechanical methods are used, with most reliance on non-chemical methods. The Fish and Wildlife Service restricts use of certain chemicals and encourages use of mechanical and biological control methods. With additional funding, weed control efforts will be expanded along roads. An integrated pest management plan that details noxious weed management goals and objectives will be prepared within two years. This will be incorporated into the habitat management plan.

Project 5 **Integrated Pest Management.** Develop and implement an integrated pest management plan for treatment of spotted and diffuse knapweed, leafy spurge,

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dalmation toadflax, orange and yellow hawkweed, Canada thistle and St. Johnswort using mechanical, chemical and biological treatments. Estimated contract cost $150,000 with .3 FTE;.

Native Forest and Upland Habitats

Currently, most Refuge forest land is in second and third growth mixed stands with a tendency toward a higher numbers of stems per acre and a greater percentage of shade tolerant species than what naturally occurred. This can be directly attributed to past timber harvest practices and aggressive fire suppression.

Fire history specific to the Refuge is spotty in the historical record but there is some information and accounts from old newspapers and Forest Service Maps. The ecological role of fire is as complex as the local habitat is diverse. Throughout its range, ponderosa pine, Western larch and, to a lesser degree, Douglas-fir are well adapted to wildfire and the dominance of these species on the LPO "dry forests" exhibits evidence of regular disturbance by wildfire.

Although specific site data is lacking, the Refuge has had a fire history paralleling that of the surrounding landscape. Prior to pioneer settlement the low elevation ponderosa pine habitat was burned by wildfire about every 5 to 25 years. Mixed stands of Douglas-fir and other species burned at somewhat greater intervals, 10 to 24 years in the drier Doug-fir types and 13 to 26 years in the wetter areas, (Agee, regarding the Okanogan NF, p. 292-293) depending upon topography, aspect, elevation and fuel type. High elevation sub-alpine fir forests have the longest fire intervals of the forest types on the Refuge at 109-275 years (Agee, p.254) depending upon the actual location. Due to the low resistance to fire of the tree species associated with the "cold forest" zone and the marginal environment in which these trees exist, regeneration and growth after disturbance can be a long and difficult process which may last for decades or centuries. The relative permanence of sub-alpine meadows is largely due to this phenomenon (Agee, p.253).

Fire suppression and logging/clearing operations have resulted in excessively high fuel loadings and conversion of forests from highly fire-resistant and fire-dependant species to shade tolerant, fire sensitive species.

The proposed action initially involves commercial and pre-commercial thinning primarily in the dry forest habitat of the Refuge. Two things will be accomplished with this approach: 1) the fuel loading will be effectively and rapidly reduced thus paving the way for prescribed fire, and 2) the goals of the Refuge to increase natural diversity and restore forest habitats to a healthier and more natural distribution of seral stages with an emphasis on mature forest will be achieved. Thinning and the return of fire will also encourage a diverse understory of native grasses, forbs, shrubs and hardwood trees.

The first of several areas scheduled for forest restoration are Starvation Flats, Durlan Springs, Minnie Flats and Biarly Flats 9 (see Map E-1). Refuge plans call for pre-commercial thinning prior to prescribed fire on approximately 1000 acres of habitat each year on average. The projects are as follows (a detailed description of Starvation, Minnie, and Biarly Flats initial site specific projects is included in Appendix E):

Habitat Restoration Projects:

Project 6 **Precommercial Thinning**. Due to the interruption of the natural fire regime most of the Refuge's forests are in an overstocked condition. Many of these overstocked stands cannot be managed commercially and require pre-commercial entry. The age and density of these stands along with their proximity to mature forests makes prescribed fire too risky as an initial treatment option. Mechanical thinning will be necessary to prepare approximately 1000 acres for prescribed fire over the next five to ten years.
Estimated cost $50,000 with 1 FTE; $25,000 in sub. years with .5 FTE.

Project 7 **Starvation Flats Forest Habitat Management** - Phases 1-3. Forest management in 900 acres of the 2,500 acre Starvation Flats area over a five to ten year period will reduce stocking levels, accelerate forest succession, reintroduce fire, improve deer winter range, and enhance habitat for Ponderosa pine dependent forest birds. The methods used will include commercial thinning from below followed by periodic application of prescribed fire.
Estimated cost $50,000 with 1 FTE; $25000 with .5 FTE in sub. years.

Project 8 **Minnie Flat Forest Habitat Management.** Minnie Flats, located south of Refuge HQ, is a well-developed stand of mature Ponderosa pine, western larch, Douglas fir, and lodgepole pine with occasional younger Douglas fir scattered throughout. The lodgepole pine is over mature at 70+ years of age and is increasingly susceptible to insect attack. The stem density of the lodgepole indicates that if beetle populations become established they could easily escalate into epidemic proportions and begin to infest the otherwise healthy Ponderosa pine. By harvesting 100% of the lodgepole pine and selection of a limited number of Douglas fir, this stand could be insulated from insect attack, made more vigorous and readied for prescribed fire.
Estimate cost $ 50,000; 1 FTE with $25,000 and . 5 FTE in subsequent years.

Project 9 **Biarly Flat Forest Habitat Management.** Biarly Flat, southeast of Refuge HQ, in the area formerly known as Biarly, is a well-developed stand of Ponderosa pine, western larch, Douglas fir and lodgepole pine with occasional younger Douglas fir scattered throughout. The lodgepole pine is over mature at 70+ years of age and is increasingly susceptible to insect attack. The stem density of the lodgepole indicates that if beetle populations become established they could easily

escalate into epidemic proportions and begin to infest the otherwise healthy Ponderosa pine. Harvesting 100% of the lodgepole pine, and selection of a limited number of Douglas fir in 160 acres would insulate this stand from insect attack, increase vigor and prepare the site for prescribed fire. This area also has a significant deciduous tree component (aspen and birch) which would benefit from removal of some of the competition.
Estimated cost $50,000 with 1 FTE; with $25000 and .5 FTE in subsequent years.

Project 10 **Upland Restoration- Aspen Enhancement**. Use harvest or other disturbance techniques to increase vigor and size of aspen copses in ten specific sites on 50 acres.
Estimated cost $ 10,000; .2 FTE

Project 11 **Snag inventory and creation.** Survey selected portions of Refuge to determine snag and large woody debris densities and create snags and downed logs in areas where these habitat components may be limiting.
Estimated cost $25,000; .3 FTE

Project 12 **Wetland Restoration.** Restore drained wetlands and hydrology, enhance Berg Lane wetland and expand McDowell Marsh and Long/Daily Lakes through diking, water control structures and vegetation control. Approximately 95 acres will be restored benefitting species such as mallard, ruddy duck, common golden eye, ringneck duck, and redhead duck, snipes, rails, shorebirds, great blue herons, reptiles and amphibians.
Estimated contract cost $ 92,000 with .5 FTE

Fire Management

A. Prescribed Fire

Perhaps more then any other single event, wildfire, has shaped and profiled the character of forests. Historically, human-caused and lightning-caused fires burned through the entire area of the Refuge with varying degrees of frequency. This repeated disturbance led to the ecological adaptation of various forest communities to degrees of tolerance to fire frequencies and intensities. Low elevation dry sites with greater fire frequencies favored those species which developed deep tap roots, thick exfoliating and insulating bark and good self pruning traits especially as the trees matured. This ensured that the larger, older specimens could survive progressively greater fire intensities due to their high fire resistance and wide spacing and thus, continue to provide seed for many years.

Forest management activities will include prescribed burns throughout the Refuge over the years this plan will be in effect. The thrust of management on the LPO, as it relates to fire, will be to

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strive for native diversity of existing forest habitats and enhance those elements which have been degraded or lost through past activities such as removal of the mature and old growth forests through land clearing and timber harvest.

The ecological role of fire is as complex as the local habitat is diverse. Throughout its range, ponderosa pine (Pinus ponderosa), Western larch (Larix occidentalis) and, to a lesser degree, Douglas-fir (Pseudotsuga menziesii) are well adapted to wildfire. These three species dominate our forest habitat and exhibit evidence of regular disturbance by wildfire.

Prior to pioneer settlement the low elevation ponderosa pine habitat was burned by wildfire every 5 to 25 years. This relatively high frequency, low intensity fire is essential to maintaining healthy stands of interior ponderosa pine. For this reason, most of the initial fire management activity will be carried out in the ponderosa pine forests. Use of fire, and other management strategies, will result in reduced stocking, increases in average stand diameters and greater vigor in the shrub, grass and forb components all of which are important to wildlife. Restoring the periodic occurrence of fire will also promote deciduous tree species such as aspen, cottonwood and birch which occurred on wet sites in far greater abundance under pre-fire suppression conditions.

Mixed stands of Douglas-fir and other species burned at somewhat greater intervals depending upon topography, aspect, elevation and fuel type. Most of the Refuge forest is dominated by Douglas-fir mixed forest in both dry and moist settings. The natural periodicity of fire in the dry Douglas-fir is between 10 and 24 years (Agee p.293) while the moist forest is somewhat longer at 13 to 26 years.

Western hemlock Western red cedar draws and high elevation sub-alpine fir types have the longest fire intervals. Fire may only visit these stands every 109 to 275 years or even longer in some locations.

The moist and cold forest zones will also benefit from occasional prescribed fire. Because the natural fire regime indicates that the fire return interval was greater in these types, the effects of fire exclusion have been proportionally less. Therefore, fire will not be used to the extent anticipated in the dry and moist forest zone, however the application of fire will still be largely guided by the concept of restoring overall forest health and vigor.

B. Fire Suppression

Until the Fire Management Plan (FMP), Appendix G, is completed and approved, all wildfires on, or threatening the Refuge, will be suppressed.

The FMP, once completed may allow for natural starts to burn under well defined conditions (i.e. under prescription); referred to as Prescribed Natural Fire. If a natural start exceeds the

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conditions as set forth in the prescription, or one of the prescriptive elements changes, then the fire will be suppressed by the best available method.

Riparian and Instream Restoration

Restoration of riparian and instream habitats will include both passive and active approaches. High priority areas for both active and passive restoration will be the alluvial riparian portions of Little Pend Oreille River and Bear Creek that are in unsatisfactory condition. Efforts to restoring flow to Bear Creek began in 1998. Stream diversions will be evaluated yearly, particularly during spring runoff. Minimum flows will be maintained in the natural channels throughout the year. Livestock grazing will be phased out first in pastures that include these alluvial riparian areas. Planting and bank stabilization will be tested in a few locations before an overall strategy is adopted. Dispersed riparian camps will be phased out within two years of CCP completion. Evaluating and correcting problem roads will occur throughout the life of the CCP.

Project 13 **Steam Restoration.** Rehabilitate 7 miles of alluvial valley habitat on Little Pend Oreille River and Bear Creek. Three of the 7 miles will include passive restoration such as removal of cows. Four miles could receive actives restoration techniques including bank reshaping, planting and weed control. Efforts in these areas will be directed at creating deep rooted vegetation to hold banks with long term riparian cover for shade and woody debris. First priority will be given to upstream segments that are affecting riparian function through bank erosion. Estimated cost: $240,000 with additional maintenance costs of .5 FTE in subsequent years

Project 14 **Hydrologic Restoration, Bear Creek Flow**. Modify diversion feeding Potter's Pond and Bayley Lake to restore flow into lower Bear Creek; install flow measuring devices below diversions for Potter's Pond Bayley Lake and McDowell Lake. Estimated initial cost $15,000; subsequent years $1000; .2 FTE

Artificial Lakes and Habitats

McDowell Lake, Bayley Lake and Potter's Pond provide many benefits to wildlife and people. All three areas were purchased with Duck Stamp dollars. FWS staff monitored waterfowl use of the lakes weekly prior to and after the fishing season opened during 1994 and 1998. Changes in waterfowl use during this time could be attributed to seasonal migratory patterns, predation, or recreational fishing. Duck numbers decreased prior to opening day on April 30 in 1994 and decreased after opeing day in 1998. These lakes support some nesting waterfowl but are suspected of being more important as spring and fall migratory stopovers. Recreational fishing may limit use of these lakes by loons, swans or bald eagles. All of these species have been seen on the lakes during spring or fall migration. Refuge regulations allow temporarily suspending fishing by posting when conditions affecting land, water, vegetation, or fish and wildlife populations warrant. Refuge staff will monitor recreation and waterfowl use of Refuge lakes and

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stipulate measures to reduce wildlife disturbance. Some measures may include altering camping locations, restricting bank fishing, eliminating motorized boats on Potter's Pond, or adjusting the fishing season. More data will be collected annually to clarify the effect of recreational fishing disturbance on Refuge birds. Step-down management plans and public use management plans will recommend a change in use if warranted

Project 15 **Fishery Enhancement Project.** Evaluate fishery potential and implement spawning habitat projects and other fishery enhancements to enhance fish reproduction and survival. $109,000 and .25 FTE.

Artificial upland habitats, primarily old fields, that no longer support native plants may be planted with crops to benefit wildlife, allowed to naturally revert back to forest habitat, thinned of encroaching trees, burned, mowed, grazed, idled, or used to interpret the interesting history of the Refuge. The specific tool will depend on the short term objective, which in some cases may simply be weed control. The CCP sets a maximum of 200 acres to be managed as forest openings. Specific numbers of acres and the management techniques prescribed for fields will be identified in the step-down habitat management plan.

Project 16 **Old Field Planting.** Till and plant 200 acres or less of old fields to be managed as openings to provide additional forage for white-tailed deer and other wildlife, control pest plants, and provide opportunities for wildlife viewing. Weed control included in the Integrated Pest Management Project.
Estimated cost $9000. ($ 3,000 per planting , 3 times in the 15 year).

Public Use Management

Priority Wildlife-Dependent Uses

The National Wildlife Refuge System Improvement Act of 1997 affirmed wildlife conservation as the primary purpose of refuges and clarified the primary recreational opportunities as those that are dependent on wildlife including fishing, hunting, wildlife viewing, wildlife photography, interpretation, and environmental education.

Under the preferred alternative, the recreation character of the Refuge will continue to be semi-primitive. Improvements will be limited. Within five years of CCP approval, Refuge staff will begin a Public Use Management Plan that will expand on and provide more detail for Refuge recreation. This step-down plan will include specific projects, site plans and other details and compliance documentation that will allow the Refuge to proceed with construction or conducting of programs.

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Project 17 **Develop and Implement Public Use Management Plan.** Estimated cost $50,000 with .5 FTE. Additional Public Use and Site planning support required from the Regional Office.

Project 18 **Refuge Brochure and Recreation Map.** Estimated cost $10,000.

Fishing Program
Fishing will continue to be an important recreational activity on the Refuge. A specific fishing plan will be developed in cooperation with WDFW , the agency with primary responsibility to set harvest regulations and seasons for resident fish and wildlife species. This plan will be included as part of the step-down Public Use Management Plan. The fishing program will strive to maintain fish population levels appropriate for habitats and provide a quality recreational experience for anglers.

Overall, the fishing program will strive to provide a fishing experience superior to that found on other private and public lands. This includes providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, and an opportunity to use various angling techniques.

Catchable-sized trout have usually been planted yearly in McDowell Lake, Potter's Pond and Bayley Lake. To reduce reliance on stocking in Bayley Lake, the CCP recommends that WDFW consider making this a catch-and-release only fishery. To provide a diversity of fishing opportunities on the Refuge, Potter's Pond will continue with standard seasons and catch limits. In McDowell Lake, Potter's Pond, and Bayley Lake, coastal rainbow trout stocks will be planted by WDFW, unless native stocks are available. Refuge staff will work with fishing interest groups toward improving conditions for natural spawning. A cooperative partnership with WDFW will be continued to manage these lakes to provide quality fishing opportunities. Stream habitats will be managed primarily for wild trout, with an emphasis on native species. There will be no stocking of non-native fish in Refuge streams. Fishing access to McDowell Lake will be improved.

Project 19 **McDowell Lake Overlook and Access.** Improve overlook and fishing access at McDowell Lake. Includes gravel for parking, wood guard rail, trail to shore, bollards, and spotting scope. $25,000.

Hunting Program
Providing quality hunting opportunities is one key goal of Refuge recreation programs. A specific hunting plan will be developed in cooperation with WDFW. Details of the hunting program will be included as part of a step-down public use management plan. The hunting

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program will strive to maintain wildlife populations levels appropriate for Refuge habitats and provide a quality recreational experience for hunters.

The hunting plan will strive to provide a hunting experience superior to that found on other private and public lands. This includes providing participants with reasonable harvest opportunities, uncrowded conditions, minimal conflicts with other users, relatively undisturbed wildlife, and limited interference from or dependence on mechanized aspects of the sport.

Wildlife Viewing and Interpretation
Refuge staff will seek partners to assist in developing a Refuge-specific wildlife viewing leaflet. Funding will be requested (TEA-21) to provide an auto tour route with interpretive signs relaying specific themes of Refuge habitats, wildlife, and history. In addition, the historic Winslow logging railroad grade will be considered for use as an interpretive trail. Rails to Trails is one possible source of funds for such a project. Annual events will be staged for International Migratory Bird Day in May, National Wildlife Refuge Week, and other occasions. Refuge staff may also participate in events sponsored by others.

Project 20 **Wildlife and Cultural Resource Interpretation.** Fabricate and install interpretive signs at key locations on the Refuge. These will be identified in the step down public use plan. This project could include a few road pullouts, but most signs will be located in existing sites including campgrounds, kiosks, fishing lakes. Project may include up to 15 interpretive signs (exterior grade laminate panels, 18" by 24"). Estimated cost $30,000.

Project 21 **Auto Tour Route.** Evaluate Rookery Road and other existing roads for potential development as a wildlife viewing tour route. Upgrade selected route to county gravel road standards and develop pull-offs and interpretive signs at key locations. Estimated Cost: $1,035,000.

Wildlife Photography
Minimal effort will be made in this area since Refuge access is relatively open and there has been little demand for specific photography opportunities.

Environmental Education
A volunteer program would be necessary to support an on-site environmental education program. There has been little demand for this type of program but that could change in the future. In the interim, Refuge staff will provide environmental education programs on an as-requested basis as other priorities and time allow. Participation in environmental education activities off-site will also be conducted. Teacher workshops could be one way to encourage use of the Refuge as a site for learning about habitats and wildlife.

Non-Priority Recreation

Camping
Camping that is associated with wildlife-dependent recreation is most popular in the early part of the fishing season and during the deer rifle-hunting season. There is also considerable camping that occurs between Memorial Day and Labor Day. Many who camp during this time period may fish but that is typically incidental to their primary camping activity. Many horseback riders camp on the Refuge. The Public Use step-down Plan will define the future of camping more specifically but some changes will be implemented prior to completion of that plan. Identifying existing campsites to be moved out of the riparian areas will be addressed in the Public Use Management Plan. Dispersed camps outside of these campgrounds in sensitive wildlife habitats will be eliminated. Some dispersed sites will remain open but dispersed riparian camps within 200 feet of water will be closed. Camping with horses will be limited to Horse Camp. When sites at this camp fill up, campers with horses will have to go off Refuge to camp. Groups with 25 or more people must apply for a special use permit to camp on the Refuge. Law enforcement patrols of Refuge camps will be made regularly throughout the camping season. Charging a fee for refuge camping will also be addressed in the Public Use Management Plan

Project 22 **Potter's Pond/Bayley Lake Site Improvements**.
Campsites at Potter's Pond and Bayley Lake will be consolidated and relocated away from the lakeshore to reduce disturbance to the lake environment. A new location will be selected at the site planning phase. This primitive, "family" campground will consist of 6-8 pull in camping spots with tent pads, fire grates, accessible pit toilet, and running water. Improvements will also be made at the same time to the roads, the fishing access and parking areas. New signs will be installed to direct and inform visitors. An Environmental Assessment will be prepared for this project following completion of the site design. Estimated development costs of $100,000; does not include cost of well development

Vehicles
Off-road motorized vehicles, including dirt bikes and all-terrain vehicles, are not allowed on the wildlife Refuges. Snowmobile use will be eliminated on Blacktail Mountain Road and on Olson Creek Road (also called Tacoma Rd) to protect wintering wildlife. Refuge staff will work with the State to relocate the existing Sno Park to State lands north of the refuge.

Horseback Riding
There is considerable horse back riding use of the Refuge. Working with local back country horse groups, Refuge staff will develop an equestrian plan that identifies trail heads, trails, roads open to riding, and other guidelines to protect Refuge resources.

Other Uses
Refuge staff will monitor all forms of recreation, including dog sledding, cross-country skiing, and mountain bike riding for their effects on wildlife and habitat and address any needed changes in the public use management plan.

To reduce conflicts between user groups, the Step-down Public Use Plan will explore separate locations for some user groups such as horseback riders. Groups exceeding 25 people must apply for a special use permit to use the Refuge.

Law Enforcement Program
Protecting refuge resources and the safety of visitors are fundamental responsibilities of refuge managemen. The Public Use Management plan will assess the protection and enforcedment needs of the refuge and make specific program recommendations. The CCP recommends increasing law enforcement staffing to just under a full time position (.8 FTE).

Visitor Entrances and Roads
There are currently 12 entrances or access points to the Refuge. The CCP recommends designating and maintaining eight (8) entrances for public access to the Refuge. Designating and enhancing the major entrances and gating the others that are used infrequently will help management to focus maintenance efforts where they are needed most. The eight major entrances were selected based on amount of use, destination, and road condition. The entrances are distributed around the perimeter of the Refuge to provide ample opportunities for visitor use throughout the Refuge.

Project 23 **HQ Kiosk and Highway 20 Kiosks**. Design and install two wood information kiosk structures. The project includes site development, pull-off parking, wood Kiosk shelters with roof, Refuge map, graphic information panels (art and fabrication) and a leaflet dispenser. Estimated cost $50,000.

Project 24 **Entrance and Regulation Signs.** Replace and upgrade entrance signs at 5 sites (two major and 3 minor). Estimated costs $15,000.

The location of the entrances are shown in the Preferred Alternative Map in the Alternatives Chapter of the DEIS and described in the table below.

Table C-1. Primary (Eight) Entrances and Improvements Needed

Entrance Name	Location/Destination/Season	Recommended Facilities
Bear Creek Road-Main Entrance	Primary entrance to the Refuge and headquarters. Open year round.	Major entrance sign, information sign
Narcisse Creek Road	Entrance to McDowell Lake, Horse Camp, River Camp and the headquarters. Open year round.	Information sign, leaflet dispenser. Install Gate.
Olson Creek Road NE Entrance	Northeast entrance to the Refuge providing access to Cal[illegible] Relocate existing info [illegible]	Small kiosk with information sign and leaflet dispenser in existing parking area
Olson Creek Road SE Entrance	Southeast entrance to [illegible] with Pend Oreille County and Tacoma Divide	Entrance and information sign
Buffalo-Wilson Road	Northwest entrance to the Refuge with access to Rymer Ridge.	Information sign
Cliff Ridge Road	South entrance to the Refuge with access to Bear Creek Campground and Bayley Lake. Closed in winter.	Information sign
Blacktail Mountain Road	East entrance to the Refuge. Closed in winter.	Entrance and information sign and gate
Bear Creek Road (Drummond Entrance)	Southeast entrance to the Refuge. Closed in winter.	Entrance and information sign and gate

Roads

Public and management access throughout the Refuge is an essential consideration in any long term management plan and requires careful deliberation since the primary resource of concern for any Refuge is wildlife. A system of roads will be maintained that provides access for forest management, habitat restoration and visitor use while minimizing negative impacts to the Refuge's natural resources.

The existing system of roads has evolved over many years. Major routes with destinations to campgrounds, lakes and private in-holdings are well established and for the most part will be maintained. A few minor roads and spurs, not necessary for management and public vehicular access, will be closed and allowed to revert to a natural condition. The plan recommends no net increase in the total miles of roads on the Refuge. A Sign Plan will be written to guide the placement, design and content of refuge signs. Road identification signs will not only aid the visitor in finding their way but will help management in conducting and enforcing a safe public use program.

Table C-2. Public Access Roads (open year around) and Improvements Needed

Road Description	Maintenance Responsibility	Improvements Needed
1. Bear Creek Road from Kitt-Narcisse Road to Headquarters.	County/Refuge	Road Improvements needed on this main access to the Refuge. Tea-21 funds requested ($657k) MMS Project 99003
2. Narcisse Creek Road from Kitt-Narcisse Road to Highway 20	County	Install New Gate at Entrance
3. Buffalo-Wilson Road from Artman-Gibson Road to end.	County	High Priority: Repair segments to reduce sedimentation.

The following criteria were developed to provide the rationale by which the Refuge road system will be managed under the Comprehensive Conservation Plan.

Criteria for Public Access Roads

Refuge roads open to the public were evaluated for need, environmental and wildlife impacts. Seasonal or periodic closure of certain roads is a typical management practice that will continue to be used in managing public use. Selected roads will be closed during critical times such as nesting season and winter use by white-tailed deer between January 1 and April 15. Other roads are closed during the winter season because of snow and in the early spring to protect the roadbeds.

Roads will be maintained and open to public vehicular use if the following criteria are met:

1. Traffic has minimal disturbance on wildlife populations.

2. Road has minimal impact on wildlife and fish habitat. (Excessive runoff and sedimentation controlled through proper design and maintenance).

3. Vehicle access is necessary to support primary wildlife-dependent activities of the Refuge: wildlife observation, hunting, fishing, wildlife photography, environmental education and interpretation.

4. Road is necessary to provide access to Refuge campgrounds.

5. Roads meet basic safety standards for road type.

6. Funding is available to make periodic improvements and repairs.

7. Traffic does not adversely affect recreational experience of primary activities.

Table C-3. Seasonal Public Access Roads and Improvements Needed.

(Roads open to street-legal vehicle access from mid-April through December if previously stated criteria are met)

Road Description	**Maintenance Responsibility**	**Improvements Needed**
1. Bear Creek Road from Headquarters to Bayley Lake	Refuge: Periodic Clearing and Grading	Bring 4.5 miles up to county standards for gravel roads. TEA-21 funds requested ($800k) MMS Project 99004
2. Bear Creek Road: Bayley to Cook Ranch	Refuge: Periodic Grading and weed control	Rehab and relocate portions of Bear Creek road from Bayley Lake cutoff to Cook Ranch. Tea-21 funds requested ($350k) MMS Project 99006
3. Rookery Road Auto Tour Route (Currently open mid-July - December)	Refuge: Periodic Grading and weed control	Major Improvements needed to bring this road up to county standards for gravel roads. Tea-21 funds ($1035k) MMS Project 99005
4. Berg Lane	Refuge: Periodic Grading and weed control	High Priority: Repair segments to reduce sedimentation
5. Cliff Ridge Road	Refuge: Periodic Grading and weed control	Place gravel and install water bars from Bear Creek Road to Refuge boundary
6. Webking Road	Refuge: Periodic Grading and weed control	General maintenance
7. Lenhart Meadows Road	Refuge: Periodic Grading and weed control	Restore washout and install water bars

8. Pierce Lake Loop Road	Refuge: Periodic Grading and weed control	General Maintenance
9. Starvation Flats Road	Refuge: Periodic Grading and weed control	General maintenance
10. Starvation Lake Road	Close with gate at boundary.	General maintenance
11. Blacktail Mountain Road	Refuge and Stimson Lumber: Periodic Grading and weed control	High Priority: Repair segments to reduce sedimentation. Replace Blacktail Mtn. Road bridge in 5-10 years.
12. Olsen Creek Road	Refuge and Stimson Lumber: Periodic Grading and weed control	High Priority. Repair segments to reduce sedimentation.

Happy Valley, Moran Creek Springs, portions of Moran Creek, Addy Mountain, and portions of Rymer Ridge Roads will be open from October 15 through December if public road access criteria are met.

Refuge Management Roads and Facilities

A network of management roads will be maintained to support habitat monitoring, fire management, habitat restoration and public safety activities. Management roads will be gated and posted with signs indicating "Authorized Vehicles Only". Construction of new roads will be minimized through maximum reliance on existing roads. Unnecessary roads will be abandoned and left to revert to a natural condition or obliterated.

Refuge administrative facilities including the headquarters, shop, storage building, residence and Winslow cabin will be maintained in their present locations and updated as necessary. The projects below describe current facility needs and funding requirements.

Project 25 **New and Replacement Gates.** An estimated 14 new gates are needed to implement the road closures identified in the CCP. Because of a history of vandalism to Refuge gates it is anticipated that gate replacement will be a recurring cost.. An additional 10 gates have been projected for the 15 year life of the plan. $28,000 and .25 FTE.

Project 26 **Initial Road Improvements and Modifications.** Upgrade and modify roads on the Refuge that are negatively affecting streams or unsuitable for public traffic. Project includes up to ½ mile of new road and upgrading and repair of 8-9 miles of existing roads. Contract costs of $300,000 with regional staff support. Refuge staff support necessary of .25 FTE.

Project 27 **Major Improvements to Bear Creek Road.** Upgrade Bear Creek Road to county standards for gravel roads. TEA-21 funding has been requested for three segments of Bear Creek Road from Kitt Narcisse to Bayley Lake and to Cook Ranch. Total estimate for the three segments is $1,807,000.

Project 28 **Shop Building Rehab.** Rehabilitate and expand existing shop to accommodate and protect equipment. Estimated Cost $400,000.

Project 29 **Winslow Cabin Improvements.** Repair and Rehab Winslow Cabin to make it safe and functional for utilization by seasonal staff and volunteers. Estimate: $75,000

Project 30 **Northern Boundary Survey.** Resurvey and repost northern refuge boundary. Estimate: $100,000.

Grazing Phase-out

The phasing out of the existing annual grazing program will begin during the grazing season following plan approval and will be completed within five years. The most sensitive habitats, particularly alluvial riparian areas, will be the first priority for phase out. A meeting with grazing permittees will be arranged to discuss details of phasing out the program. During and following phase-out, surplus fences will be removed and new fences constructed to prevent off-refuge livestock trespass.

Project 31 **Livestock Facilities-Modification and Removal**. Eliminate fences that no longer serve a management need and negatively affect wildlife and recreation. Estimated cost if contracted: $406,000, including 9 miles of new perimeter and inholding fence at $3.00 per foot and 50 miles of removal at $1.00 per foot. Costs will be spread out over the fifteen year life of the plan.

Cultural Resources

Cultural resources management will be integral component of refuge management for the life of the CCP. Although basic compliance with Section 106 of the National Historic Preservation Act will continue, a modest program of cultural resource inventory, evaluation, site stabilization, and maintenance will be carried out. These projects will permit mangers to reduce potential conflicts between cultural resource and habitat or public use projects. The result will be compliance with section 110 of the National historic Preservation Act and progress toward the LPO NWR vision and guiding principles.

Refuge staff will offer to meet with Tribal officials of the Colville and Kalispel tribes yearly. Since very little is known about the prehistory of the Refuge, this area will be a focus of future cultural resource field effort. Outreach to the tribes may present opportunities to learn more about Native American use of the area. Efforts will also be made to reach former landowners from the pre-Refuge era to represent the continuum of human use of the Refuge through time.

Project 32 **Cultural Resource Inventory and Evaluation**. Conduct a sample inventory for cultural resources, yet focus on habitats, facilities, and areas that are subject to management by other CCP projects. Evaluate a sample of the resources to identify qualities that confer significance or non-significance to the cultural resources. Integrate information into public use materials and habitat management planning. Cost includes fieldwork, analysis, mapping, GIS data, reporting. Estimated cost $125,000.

Project 33 **Historic Property Maintenance and Stabilization**. Take actions to arrest the decay and erosion of a sample of significant historic properties. Follow Secretary of Interior Standards as appropriate. Integrate data into public use materials. Estimated cost $100,000

Research

Refuge staff will seek funds and partners to study Refuge fish, wildlife, plants, and habitats. Specific projects for research include the effects of eliminating livestock grazing on vegetation and the effects of thinning and prescribed burning on Refuge wildlife. Additional opportunities will develop through time. Most staff effort will focus on projects with management applications.

Project Summary -The Preferred Alternative E

The Comprehensive Conservation Plan identifies 33 projects for development or restoration over the next 15 years. Total cost to implement these projects in the preferred alternative is estimated at $7,016,000. This figure includes 2.8 million in major road improvements identified under the Transportation Equity Act funding for the 21st Century (TEA-21). The CCP proposes these projects for the next 15 years as a way of identifying funding needs at the time of preparation of the plan. All CCP projects will be included in the Refuge Management Information System (RONS - Refuge Operational Needs System or MMS - Maintenance Management System) which is used nationally to identify needs and request funding from Congress.

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Table C-4. Summary of Wildlife and Habitat Restoration Projects

CCP Proj. No.	Project Description	RONS/MMS Project No.	Estimated Cost
1	*Landbird Surveys*	*Proposed*	$200,000
2	*Vertebrate Survey (Contract)*	*RONS 97003*	$100,000
3	*Studies and Investigations (Contract)*	*Proposed*	$50,000
4	*Habitat Management Plan*	*Proposed*	$80,000
5	*Integrated Pest Management (Contract)* *($10,000/yr)*	*RONS 97011*	$150,000
6	*Precommercial Thinning* *(Ongoing - $75,000/yr)*	*FIREPRO Funds*	$1,125,000
7	*Starvation Flats Forest Habitat Management* *(See Appendix E)*	*Proposed*	$50,000
8	*Minnie Flat Forest Habitat Management*	*Proposed*	$50,000
9	*Biarly Flat Forest Habitat Management*	*Proposed*	$50,000
10	*Upland Restoration- Aspen Enhancement*	*Proposed*	$10,000
11	*Snag inventory and creation*	*Proposed*	$25,000
12	*Wetland Restoration*	*RONS 97010*	$92,000
13	*Stream/Riparian (Active) Restoration* *4 miles at 60,000*	*Proposed*	$240,000
14	*Hydrologic Restoration (Bear Creek Flow)*	*Proposed*	$15,000
15	*Fishery Enhancement*	*Proposed*	$109,000
16	*Old field farming (200 Acres)* *(Replant every 3 years- $3000 each time)*	*Proposed*	$9,000
		Total	**$2,355,000**

Table C-5. Summary of Public Use Projects

CCP Proj. No.	Description	RONS/MMS Project No.	Estimated Cost
17	*Develop and Implement Public Use Plan*	*RONS 97007*	$50,000
18	*Refuge Brochure and Recreation Map*	*Rons 97013*	$10,000
19	*McDowell Lake Overlook and Access*	*Proposed*	$25,000
20	*Wildlife and Cultural Resource Interpretive Signs*	*RONS 97012*	$30,000
21	*Wildlife Viewing Auto Tour Route (TEA-21 funding)*	*MMS 99005*	$1,035,000
22	*Potter's Pond Bayley Lake Site Improvements*	*Proposed*	$100,000
23	*Headquarters and Hwy Kiosk Information Sites (2)*	*RONS 97014*	$50,000
24	*Entrance and Regulation Signs*	*Proposed*	$20,000
		Total	**$1,320,000**

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Table C-6. Summary of Maintenance and Administrative Projects

CCP Proj. No.	Description	*RONS/MMS Project No.*	Estimated Cost
25	*New & Replacement Gates*	*Proposed*	*$28,000*
26	*Initial Road Improvements and Modification*	*Proposed*	*$300,000*
27	*Major Bear Creek Road Rehab (TEA 21 funding)*	*MMS 99003* *MMS 99004* *MMS 99006*	*$1,807,000*
28	*Shop Building Rehab*	*MMS 96019*	*$400,000*
29	*Winslow Cabin Improvements*	*MMS 97010B*	*$75,000*
30	*Northern Boundary Survey*	*MMS 96023*	*$100,000*
31	*Livestock Facilities Modification/Removal*	*Proposed*	*$406,000*
32	*Cultural Resource Inventory and Evaluation*	*Proposed*	*$125,000*
33	*Historic Property Maintenance and Stabilization*	*Proposed*	*$100,000*
		Total	***$3,341,000***

Table C-7. Total Project Costs Proposed for Next 15 Years

	Habitat Projects	$2,355,000
	Public Use Projects	$1,320,000
	Maintenance/Administrative Projects	$3,341,000
	Refuge Total ***(Refuge Total Without TEA-21 Projects)***	**$7,016,000** **($4,174,000)**

Staffing Recommendations

Currently, the Refuge staff includes eight permanent, full-time positions and approximately nine seasonal positions including:

Permanent, Full Time Staff (7.8 FTEs)

1. Refuge Manager
2. Refuge Operations Specialist FMO
3. Wildlife Biologist
4. Forester
5. Maintenance Worker
6. Administrative Specialist
7. Prescribed Fire Specialist
8. Fire Crew Foreman

Seasonal, Temporary Staff (4.5 FTEs)

1. Office Clerk
2. Bio-Tech
3. Park Ranger
4. Heavy Equip. Operator
5. Engine Foreman (Firefighter)
6. Firefighter
7. Firefighter
8. Firefighter
9. Firefighter

In addition, the seasonal, temporary positions have also included a four-person Youth Conservation Corps (YCC) crew and adult crew leader. The YCC program has been in operation on the Refuge since 1995. A fire crew of four persons was added to the Refuge in 1997/98.

Funding for five additional permanent staff is needed to implement the Comprehensive Conservation Plan. This includes converting three of the temporary positions to permanent. The CCP recommends the following:

Proposed Additional Permanent Staff

9. Fire Management Officer
10. Law Enforcement Officer
11. Outdoor Recreation Planner
12. Biological Technician
13. Office Automation Clerk
14. Heavy Equipment Operator

The new permanent positions will be necessary to implement the habitat restoration and public use objectives identified in the plan. The biological technician and the outdoor recreation planner positions would be critical in developing the Habitat Management and Public Use step-down plans. Opportunities to share employees with other federal agencies (Forest Service, National Park Service), will be explored as budgets and other commitments allow.

Additions to the Refuge budget or another funding source would be necessary to support new forestry, wildlife, and maintenance positions. Fire management staff and portions of administrative support staff salaries would be paid through fire suppression and prescribed fire funds.

Any money generated from Refuge projects goes into the general treasury and does not come back to the Refuge. Some money is returned, however, to Stevens and Pend Oreille Counties from the Refuge Revenue Sharing account, which provides in lieu of tax dollars to support schools and other county offices.

To make the Refuge vision a reality, new sources of funds will be tapped and a volunteer program and partnerships established. Annual operating and maintenance funds from Fish and Wildlife Service congressional appropriations will continue to be an important funding source. Other federal sources may include Transportation Equity Act funds (TEA-21), challenge-cost share non-game migratory bird funds, and recreational fishing funds. Outside funding sources will be explored including National Fish and Wildlife Foundation, Bonneville Power Administration Fish and Wildlife Project Funds, and private foundation dollars.

Partnership Opportunities

There are many opportunities to develop partnerships with other agencies, industry, and various interest groups. These opportunities are a key to achieving Refuge goals. Volunteers will be sought to assist with specific jobs. Volunteer programs and partnerships, like any relationship, requires an investment of time and energy. Returns on these investments can be rewarding or disappointing and should motivate their future.

Land Acquisition

Refuge staff will seek opportunities to acquire lands within the approved Refuge boundary (in-holdings) from willing sellers. These will be the highest priorities for acquisition. Other lands outside of the boundary will be considered for protection as opportunity arises. Priority for protection outside of the refuge boundary will be lands adjacent to the refuge particularly riparian, wetland, Ponderosa pine and high elevation forest (above 4,000 foot elevation) habitats. Medium priority for protection will be lands adjacent to other Service managed properties in Stevens and Pend Oreille Counties and seasonally flooded agricultural lands within the Colville River floodplain. Other opportunities may be considered to consolidate ownership with other federal or state agencies through land trades. These will only be considered if there is a net positive gain for wildlife.

Land protection methods may include cooperative agreements, conservation easements, fee title acquisition, leases, donations, transfers, and exchanges. Only willing participants will be considered for any of these approaches.

Compliance Requirements for Plan Implementation

Few actions are exempt from compliance requirements. Many management programs require compliance with one or more of the following:

- Joint Aquatic Resource Protection Act with the county and state review
- National Environmental Policy Act documents
- Section 404 of the Clean Water Act
- Endangered Species Act consultation with the Upper Columbia Fish and Wildlife Office
- Cultural Resource clearance
- Consultation with Native American Tribal Governments
- Coordination with neighboring landowners
- Pesticide Use Proposal
- Clean Air Act permits
- Americans with Disabilities Act
- Compatibility Determinations

Additional compliance requirements may be necessary for some actions.

Appendix D: Statement of Compliance

In undertaking the proposed action, the following Executive Orders and legislative acts have been or will be acted upon:

1. Executive Order No. 11593, Protection and Enhancement of the Cultural Environment. If the Service proposes any development activities that would affect the archaeological or historical sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.

2. Executive Order No. 11988, Floodplain Management. No structures or other barriers that could either be damaged by or significantly influenced the movement of floodwaters are planned for construction by the Service in the project area. The proposal supports the preservation and enhancement of the natural and beneficial values of floodplains.

3. Executive Order No. 11990, Protection of Wetlands. The proposal will help conserve the natural and beneficial values of the wetland habitat. The Service will undertake no activity that would be detrimental to the continuance of the vital wetlands.

4. Executive Order No. 12372, Intergovernmental Review of Federal Programs. The State of Washington and counties that encompass the Refuge were sent copies of the Draft Comprehensive Conservation Plan and Environmental Impact Statement for distribution to State and County agencies and departments. Coordination and consultation is ongoing with local and State governments, Tribes, Congressional representatives, and other Federal agencies.

5. Executive Order No. 12996, Management and General Public Use of the National Wildlife Refuge System. Through the development of the Comprehensive Conservation Plan, the Service will complete compatibility determinations for existing wildlife-dependent recreational activities that will be allowed to continue in the Final Comprehensive Conservation Plan.

6. Executive Order No. 12898, Environmental Justice in Minority Populations and Low-income Populations. This environmental justice analysis concluded that the socioeconomic, cultural, physical, and biological effects of the proposed alternative does not predict any outcomes that would cause disproportionately high and adverse human health impacts in any population, nor would they result in disproportionally high or adverse impact to low-income or minority populations, nor would any alternative create a greater burden on low-income households.

7. Secretarial Order 3127 (602 DM 2) Contaminants and Hazardous Waste Determination. No contaminants or hazardous waste are know to exist on the Refuge, and none will be created.

8. Endangered Species Act of 1973, as amended, Section 7. An internal Section 7 consultation is being conducted. No significant impact is expected from the implementation of the Proposed Action.

9. Refuge Recreation Act as amended. The draft CCP is in compliance.

10. National Wildlife Refuge System Act of 1966, as amended. The draft CCP is in compliance.

Refuge Project Leader   Date

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Appendix E: Detailed Description and Analysis of Forest Management Pilot Projects

I. Starvation Flats Forest Habitat Management

Present Stand Conditions:

The forest in the Starvation Flats area was harvested between the 1890s to the mid-1930s and the existing stand is dominated by overstocked groups of ponderosa pine, 50 to 70 years old, and scattered, small groups and individual lodgepole pine of similar age. Stress is evident in this age class as represented by slowed growth rates and increasing insect activity. Data indicates that approximately 85% of the unit is composed of ponderosa pine, 15% lodgepole and less then 1% is Douglas-fir and Western larch.

Although most of the true old growth ponderosa pine forest component is long gone from this unit, there are single trees and natural groupings of trees in the >125 year age classes which are beginning to exhibit the desirable characteristics of mature forests. Wildlife species dependent upon, or closely associated with, this type of habitat are expected to benefit from this treatment including, but are not limited to, flammulated owls, white-headed woodpeckers, white-breasted nuthatches, pygmy nuthatches, brown creepers, western bluebirds, and the silver-haired, hoary and pallid bats.

There are also well distributed groups of seedling and sapling size ponderosa pine. Actions affecting these age classes are further described below.

Management Objectives:

1. To accelerate the process by which a larger component of the ponderosa pine forests of the Refuge will achieve the characteristics typical of those stands which existed prior to settlement and thus help us attain one of the stated Refuge goals of increasing native diversity.

2. To reduce fuel loading and stand density in preparation for returning fire to its natural role in the forest through prescribed burning.

3. To reduce the forest canopy and enhance the production of winter forage and hiding cover (brush) for whitetail deer.

4. To increase the overall stand vigor and growth rate; and reduce susceptibility to insect attack.

5. To stimulate and encourage the propagation of deciduous tree species, primarily quaking aspen white birch and water birch which were historically much more common then they are today and represent an important component of this forest community.

6. To reduce competition for available nutrients and resources.

Proposed Treatments for Starvation Flats:

The forest treatments undertaken, particularly in the ponderosa pine stands, would remove excessive stems of merchantable size from age classes less then 70 years. When trees in the < 70 years age category predominate within the stand, those trees between 70 and 125 years would also be considered here. To achieve the objective of promoting stand development towards mature forest, cut-tree selection in older age classes would be based upon those trees exhibiting poor form, vigor, or that pose a significant risk of disease or insect mortality. Leaving the best trees of <125 years, and reducing competition through better spacing will ensure that a significant number of these trees reach maturity

Ponderosa pine groups and individuals within the treatment area which exceed 125 years of age, will be handled somewhat differently since many of these groups are beginning to show the mature forest characteristics being sought such as larger size and enhanced habitat qualities including broken tops, flattened tops, large coarse branches and hollow boles, all of which contribute to diversifying and augmenting wildlife habitat. For the most part, many of these stands will be left alone to continue to develop.

In some instances, these maturing trees will be marked for removal where reduced competition and better spacing will enhance the longevity and vigor of the group. Under these conditions selection criteria normally associated with timber production will be applied secondarily. The fundamental selection criteria will be the trees inherent value to wildlife as described above.

Pockets of regeneration in the seedling to sapling stages will not be affected during the harvest portions of the habitat management activities. These age classes will be dealt with under prescribed fire activities during burn unit preparation (thinning) and actual fire application.

A small amount of Douglas-fir and Western larch exist on the Starvation Flats Unit. These species are confined to microsites that have aspects and moisture regimes conducive to their establishment and growth. Because they contribute to the overall diversity of the unit, none of these species will be removed.

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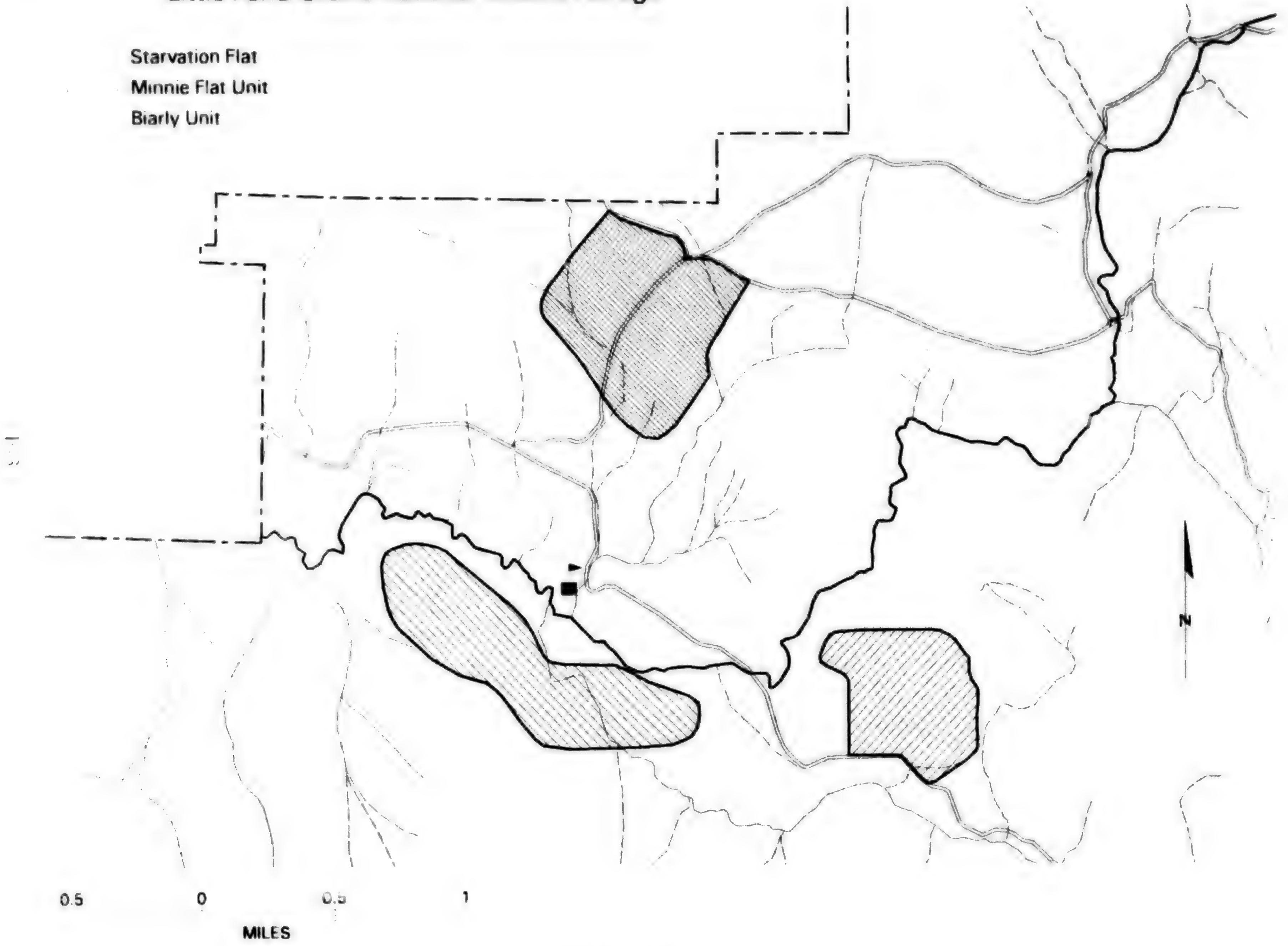
Map E-1. Pilot Forest Management Projects
Little Pend Oreille National Wildlife Refuge



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Ron Reitel 12 April 1999 f:\lpo\ \forestmgmt.a

Effects of Treatment on Forest Habitat: The effect of these treatments would be to reduce the overall tree density, favoring the larger, healthier trees under 125 years of age while preserving older age trees and taking advantage of the wildlife qualities they already possess. Such treatments are considered to be particularly effective at promoting the diameter and height growth of the remaining stand, thus speeding the development of mature and old growth characteristics such as large boles, large limbs and robust canopies (Oliver and Larson, 1990). Thinning and use of prescribed fire is also intended to promote conditions that would be favorable to reintroduction of a more natural fire disturbance regime over the long term, thus lessening the likelihood of a "catastrophic" fire that could burn areas and threaten adjacent property and resources. Scientists studying the ecosystems of the Interior Columbia Basin have repeatedly emphasized the importance of restoring natural ecological processes such as regular fire disturbance in this area (Quigley, et. al., 1996). The suppression of natural fire is implicated in several problems widespread across Interior Columbia Basin ecosystems, including severe insect outbreaks and loss of native species diversity.

Suppression of natural fire and past logging have resulted in many stands in similar condition in the Refuge's dry forest types. Returning prescribed fire to these stands will require reducing stocking levels and opening the canopy to condition them for periodic application of fire. Thinning the stand from below will emulate the progression of forest succession by removing a number of stems that are artificially present as a result of fire suppression, improve winter range conditions for deer by increasing forage and enhance habitat for Ponderosa pine-dependent forest birds.

For Starvation Flats, the above described treatments are planned throughout the ponderosa pine forest type over the next 5-10 years. The size of these treatment areas will vary from about 150 to 300 acres. There are about 4500 acres of ponderosa pine habitat on the Refuge.

Size of unit:	300 acres
Size of trees removed:	Average ≤ 12 inches
Species of trees removed:	85% Ponderosa pine, 15% lodgepole pine. No larch or Douglas fir will be removed.
Slope:	0 to 25%
Aspect:	flat
Soils:	Virtually all of the soils associated with this area are derived from glacial outwash with granitic base mantled with loess and volcanic ash. Drainage is moderate to excessive throughout. Soils from Stevens County Soil Survey include 30, 31, 46, 48, 77, 207, 216, 221, 223 and 226.

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Harvest plans: All operations would be completed between September and mid-February requiring about a three-month period. Trees would be processed at the stump by a mechanical harvester and logs would be moved to existing roads for decking using a mechanical forwarder. Tops and branches will be scattered at the processing site.

Prescribed fire plans: Prescribed burning would be conducted in the succeeding fall, late winter or early spring prior to nesting season. Details will be found in the individual prescription for the unit.

Roads: No new roads will be developed in unit. Existing roads, railroad grade, or disked lines would be used for fire breaks.

Plans for snags, large woody debris, other important wildlife habitat features: No snags will be removed unless necessary for safety. Because the current stand is a relatively young stand for the species, few snags exist at present. The snag component will increase through natural mortality especially in the greater then 125 year age class. Trees with mistletoe, exfoliating bark, dead tops and other desirable characteristics will not be targeted for harvest as these are important components of wildlife habitat.

Pre-treatment/post-treatment data collected: Currently there exists photo points, bird point counts, small mammal trapping, extensive vegetation monitoring and surveys for northern goshawk. Plans call for an owl survey to be conducted. If a species of interest is discovered (proposed, threatened or endangered) measures will be taken to protect the species according to guidelines delineated in the CCP, the Refuge wildlife management plan and the state priority habitats guidebook governing birds.

Plant species affected/benefitted: Ponderosa pine and its associated species community will be favored. Fire should reinvigorate forbs, grasses, brush and aspen components but may, depending on timing of burn, negatively affect bitterbrush - a planted non-native shrub.

Wildlife species affected/benefitted: Other wildlife species that will be advantaged are found among the neo-tropical migratory birds especially those requiring naturally functioning mature forests and snag dependant species such as flammulated owls. Also resident snag dwelling species such as pileated and white-headed woodpeckers will be benefitted. Shrub nesting neo-tropical migrants, including chipping sparrows and black-headed grosbeaks will profit from the increased woody understory. There may be some limited direct mortality to small mammals and reptiles over the short-term. Increasing average tree diameters and shrub and aspen understories will benefit the wildlife community in general.

Impacts to water: No effects are expected due to the timing (late fall early winter)and location (no surface water within 600 feet of harvest boundary) of the harvest and the fact that no new roads or skid-trails will be used.

Impacts to soil: Limited due to harvest season and equipment used. Snow and frozen ground will reduce impacts of operation to soil. Equipment used will be the least damaging form of mechanical ground based systems; mechanical harvesters and forwarders.

Impacts to air quality: Short duration smoke during prescribed fire. Burn will not be conducted when smoke may cause adverse impact to smoke sensitive sites downwind. Service policy requires that state smoke management guidelines be adhered to. This will be coordinated and monitored by the responsible state agency. Refer to Refuge Fire Management Plan and State of Washington Smoke Management Plan.

II. Minnie Flats Forest Habitat Management

Present Stand Conditions:

This area located just south of the Refuge Headquarters, and south of the Little Pend Oreille River is a mixed stand dominated by large, high quality ponderosa pine with a large proportion of Douglas-fir, Western larch and over-mature lodgepole pine serving as co-dominants. As a result of fire suppression and past logging activities which removed the very largest trees, this stand is converting to a more shade tolerant mix consisting of Douglas-fir and grand fir.

The lodgepole pine, which constitutes about one third of the stems, is rapidly declining as it has surpassed its maturity of about 70 years of age. Insects and fungal rots are evident in this stand. A build-up of these organisms could result in successful attacks on the otherwise healthy ponderosa pine which is a featured forest community in our management plan that the Refuge is interested in restoring.

Suppression of natural fire and past logging have resulted in many stands in similar condition in the Refuge's dry forest types. Returning prescribed fire to these stands will require reducing stocking levels and opening the canopy to condition them for periodic application of fire. Thinning the stand from below will emulate the progression of forest succession, improve winter range conditions for deer and enhance habitat for Ponderosa pine-dependent forest birds.

Management Objectives:

1. To accelerate the process by which a larger component of the dry forests of the Refuge will achieve the characteristics typical of those stands which existed prior to settlement and thus help us attain one of the stated Refuge goals of increasing native diversity.

2. To increase the overall stand vigor and reduce susceptibility to insect attack.

3. To reduce competition for available nutrients and resources.

4. To reduce fuel loading and stand density in preparation for returning fire to its natural role in the forest through prescribed burning.

5. To reduce the forest canopy and enhance the production of winter forage and hiding cover (brush) for whitetail deer.

6. To stimulate and encourage the propagation of deciduous tree species, primarily quaking aspen white birch and water birch which were historically much more common then they are today and represent an important component of this forest community.

Proposed Treatments for Minnie Flats:

In addition to the lodgepole pine, those shade tolerant species, primarily grand fir, which are encroaching on the unit as a result of fire suppression, would be targeted for removal. Removal of the declining lodgepole, while they are still merchantable, along with a selected number of other species, will allow the Refuge staff the opportunity to sanitize the stand, prepare this area for prescribed fire and enhance the deer winter range.

Thinning from below and removing 100 % of the mature lodgepole and selected other species, will favor the Ponderosa pine, larch and Douglas fir; increase average tree diameter of target species; encourage shrubs and aspen; reduce risk from catastrophic fire; condition the stand for prescribed fire; and reduce risk of pine beetle outbreak in ponderosa pine. Loss of mature lodgepole, which is not a preferred wildlife species, will be offset by returning prescribed fire to the stand and enhancing those aspects of a mature dry forest such as large tree size, greater spacing between stems and increasing the relative proportion of ponderosa pine in the stand.

This treatment would entail cutting all of the merchantable lodgepole pine and grand fir using mechanical harvesters to the limit of their capability (hand falling would be required where trees exceed 20 inches at the stump). Ponderosa pine, Douglas-fir and Western larch would be removed where they are of merchantable size and to achieve a spacing where ladder fuels are reduced and the canopy is opened to allow more light to reach the forest floor thus stimulating understory hardwood trees, shrubs, grasses and other herbaceous growth.

Effects of Treatment on Forest Habitat: The primary effect of this habitat treatment will be to reduce the incidence of shade tolerant species and excessive numbers of small stems. This reduction in competition for resources and renewal of natural fire processes will ensure that the remaining, desirable trees have the best chance of growing to maturity and occupying the site well into old age. Overall forest health will benefit from the likelihood that disease prone trees will be removed and the risk of a stand replacement wildfire will be abated. This will support our objective of increasing the percentage of mature forest on the Refuge.

Opening the canopy and reducing understory trees will also allow more light to reach the ground stimulate the growth of shrubs, forbs and grasses, thus enhancing forage for white-tailed deer. This includes the stimulation of aspen stems which are of great importance to deer, grouse and a wide variety of other species throughout its life cycle. Aspen is declining in many areas where it once flourished due to the encroachment of shade tolerants and competition. Enhancing the shrub component (an important factor in white-tailed deer winter range) is another objective of the Refuge CCP which will be augmented by this action.

Other wildlife species that will be benefitted are found among the neo-tropical migratory birds especially those requiring naturally functioning mature forests and snag dependent species such as flammulated owls. Also resident snag dwelling species such as pileated and white-headed woodpeckers will be benefitted. Shrub nesting neo-tropical migrants, including chipping sparrows and black-headed grosbeaks will profit from the increased woody understory.

Size of unit:	180 acres
Size of trees removed:	Average 12 inches; some larger lodgepole and Douglas-fir will also be removed (see above)
Species of trees removed:	Any species may be removed to achieve objectives described above
Slope:	0-25%
Aspect:	flat
Soils:	Virtually all of the soils associated with this area are derived from glacial outwash with granitic base mantled with loess and volcanic ash. Drainage is moderate to excessive throughout. Soils from Stevens County Soil Survey include 119,146, 207 and 208.

Harvest plans: All operations will be completed between September and mid-February. Trees would be cut by mechanical harvester, or hand felled where necessary, and moved to existing roads using a mechanical forwarder. Logs will be decked on the edge of Webking Road. Tops and branches will be scattered at the stump. Hauling of fill material and grading may be necessary on the Webking Road which serves as the main route into, and out of, this unit.

Prescribed fire plans: Broadcast burn would be conducted in the following late winter, spring, fall or following spring prior to nesting season. Details will be found in the individual prescription unit.

Roads: No new roads will be developed in the unit but some improvement will be needed on haul road to protect water quality and provide safe driving conditions. Some culvert pipe may be needed.

Plans for snags, large woody debris, other important wildlife habitat features: No snags will be removed unless necessary for operator safety. The snag component in the stand will increase through natural mortality. Trees with mistletoe, exfoliating bark, dead tops, etc. will not be targeted for harvest as these are important wildlife habitat components.

Pre-treatment/post-treatment data collected or to be collected: Photo points will be established to assess future stand development and whether objectives have been achieved. Other data may be collected such as bird point counts, snag and small mammal surveys and vegetation assessment for white-tailed deer winter range. Prior to harvest, stands will be surveyed for use by northern goshawk and other raptors, woodpeckers and owl use.

Plant species affected/benefitted: Ponderosa pine, Western larch and Douglas-fir will be favored as leave trees. Reduced competition and fire should reinvigorate grass, forbs, brush, aspen and other hardwood components.

Wildlife species affected/benefitted: There may be some limited direct mortality to small mammals and reptiles from use of fire over the short-term. Increasing average tree diameters and shrub and aspen understories will provide long-term benefits for the wildlife community notably some of the migratory bird species (see above).

Impacts to water: No effects are expected as the harvest unit is on a bench above the Little Pend Oreille River and well out of the floodplain.

Impacts to soil: Limited due to harvest season and equipment used. Snow and frozen ground will reduce impacts of operation to soil. Equipment used will be the least damaging form of mechanical ground based systems; mechanical harvesters and forwarders.

Impacts to air quality: Short duration smoke during prescribed fire. Burn will not be conducted when smoke may cause adverse impact to smoke sensitive sites downwind. Service policy requires that state smoke management guidelines be adhered to. This will be coordinated and monitored by the responsible state agency. Refer to Refuge Fire Management Plan and State of Washington Smoke Management Plan.

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III. Biarly Flats Forest Habitat Management

Present Stand Conditions:

This area, located about one mile southeast of the Refuge Headquarters, and south of the Little Pend Oreille River in an area formerly known as Biarly, is a mixed stand dominated by large, high quality ponderosa pine with a large proportion of Douglas-fir, Western larch and over-mature lodgepole pine serving as co-dominants. As a result of fire suppression and past logging activities which removed the very largest trees, this stand is converting to a more shade tolerant mix consisting of Douglas-fir and grand fir.

The lodgepole pine, which constitutes about one third of the stems, is rapidly declining as it has surpassed its maturity of about 70 years of age. Insects and fungal rots are evident in this stand. A build-up of these organisms could result in successful attacks on the otherwise healthy ponderosa pine which is a featured forest community in our management plan that the Refuge is interested in restoring.

Suppression of natural fire and past logging have resulted in many stands in similar condition in the Refuge's dry forest types. Returning prescribed fire to these stands will require reducing stocking levels and opening the canopy to condition them for periodic application of fire. Thinning the stand from below will emulate the progression of forest succession, improve winter range conditions for deer and enhance habitat for Ponderosa pine-dependent forest birds.

Management Objectives:

1. To accelerate the process by which a larger component of the dry forests of the Refuge will achieve the characteristics typical of those stands which existed prior to settlement and thus help us attain one of the stated Refuge goals of increasing native diversity.

2. To increase the overall stand vigor and reduce susceptibility to insect attack.

3. To reduce competition for available nutrients and resources.

4. To reduce fuel loading and stand density in preparation for returning fire to its natural role in the forest through prescribed burning.

5. To reduce the forest canopy and enhance the production of winter forage and hiding cover (brush) for whitetail deer.

6. To stimulate and encourage the propagation of deciduous tree species, primarily quaking aspen white birch and water birch which were historically much more common then they are today and represent an important component of this forest community.

Proposed Treatments for Biarly Flats:

Removal of the declining lodgepole, while they are still merchantable, along with a selected number of other species will allow the Refuge staff the opportunity to sanitize the stand, prepare this area for prescribed fire and enhance the deer winter range. In addition to the lodgepole pine, those shade tolerant species, primarily grand fir, which are encroaching on the unit as a result of fire suppression, would be targeted for removal.

Thinning from below and removing 100% of the mature lodgepole and selected other species, will favor the Ponderosa pine, larch and Douglas fir, increase average tree diameter of target species; encourage shrubs and aspen; reduce risk from catastrophic fire; condition the stand for prescribed fire, and reduce risk of pine beetle outbreak in ponderosa pine. Loss of mature lodgepole, which is not a preferred wildlife species, will be offset by returning prescribed fire to the stand and enhancing those aspects of a mature dry forest such as large tree size, greater spacing between stems and increasing the relative proportion of ponderosa pine in the stand.

This treatment would entail cutting all of the merchantable lodgepole pine and grand fir using mechanical harvesters to the limit of their capability (hand falling would be required where trees exceed 20 inches at the stump). Ponderosa pine, Douglas-fir and Western larch would be removed where they are of merchantable size and to achieve a spacing where ladder fuels are reduced and the canopy is opened to allow more light to reach the forest floor thus stimulating understory hardwood trees, shrubs, grasses and other herbaceous growth.

Effects of Treatment on Forest Habitat: The primary effect of this habitat treatment will be to reduce the incidence of shade tolerant species, excessive numbers of small stems and prepare the unit for prescribed fire. This reduction in competition for resources and renewal of natural fire processes will ensure that the remaining, desirable trees have the best chance of growing to maturity and occupying the site well into old age. Overall forest health will benefit from the fact that disease prone trees will be removed and the risk of a stand replacement wildfire will be abated. This will support our objective of increasing the percentage of mature forest on the Refuge.

Opening the canopy and reducing understory trees will also allow more light to reach the ground stimulate the growth of shrubs, forbs and grasses thus enhancing forage for white-tailed deer. This includes the stimulation of aspen stems which are of great importance to deer, grouse and a wide variety of other species throughout its life cycle. Aspen is declining in many areas where it once flourished due to the encroachment of shade tolerants and competition. Enhancing the white-tailed deer winter range is another objective of the Refuge management plan which will be augmented by this action.

Other wildlife species that will be advantaged are found among the neo-tropical migratory birds especially those requiring naturally functioning mature forests and snag dependant species such as flammulated owls. Also resident snag dwelling species such as pileated and white-headed woodpeckers will be benefitted. Shrub nesting neo-tropical migrants, including chipping sparrows and black-headed grosbeaks will profit from the increased woody understory.

Size of unit:	160 acres
Size of trees removed:	Average < 12 inches; some larger lodgepole and Douglas-fir will be removed will also be removed see above
Species of trees removed:	Any species may be removed to achieve objectives described above
Slope:	0-25%
Aspect:	predominantly flat with some gentle south and west facing slopes
Soils:	Virtually all of the soils associated with this area are derived from glacial outwash with granitic base mantled with loess and volcanic ash. Drainage is moderate to excessive throughout. Soils from Stevens County Soil Survey include 144,145, 147, and 207

Harvest plans: All operations will be completed between September and mid-February. Trees would be cut by mechanical harvester, or hand felled where necessary, and moved to existing roads using a mechanical forwarder. Logs will be decked on the edge of Webking Road. Tops and branches will be scattered at the stump. Hauling of fill material and grading may be necessary on the Webking Road which serves as the main route into, and out of, this unit.

Prescribed fire plans: Broadcast burn would be conducted in the following late winter, spring, fall or following spring prior to nesting season. Details will be found in the individual prescription unit.

Roads: No new roads will be developed in the unit but some improvement will be needed on haul road to protect water quality and provide safe driving conditions. Some culvert pipe may be needed.

Plans for snags, large woody debris, other important wildlife habitat features: No snags will be removed unless necessary for operator safety. The snag component in the stand will increase through natural mortality. Trees with mistletoe, exfoliating bark, dead tops, etc. will not be targeted for harvest as these are important wildlife habitat components.

Pre-treatment/post-treatment data collected or to be collected: Photo points will be established to assess future stand development and whether objectives have been achieved. Other data may be collected such as bird point counts, snag and small mammal surveys and vegetation assessment for white-tailed deer winter range. Prior to harvest, stands will be surveyed for use by northern goshawk and other raptors, woodpeckers and owl use.

Plant species affected/benefitted: Ponderosa pine, Western larch and Douglas-fir will be favored as leave trees. Reduced competition and fire should reinvigorate grass, forbs, brush, aspen and other hardwood components.

Wildlife species affected/benefitted: There may be some limited direct mortality to small mammals and reptiles from use of fire over the short-term. Increasing average tree diameters and shrub and aspen understories will provide long-term benefits for the wildlife community notably some of the migratory bird species (see above).

Impacts to water: No affects are expected as the harvest unit is on a bench above the Little Pend Oreille River and well out of the floodplain.

Impacts to soil: Limited due to harvest season and equipment used. Snow and frozen ground will reduce impacts of operation to soil. Equipment used will be the least damaging form of mechanical ground based systems; mechanical harvesters and forwarders.

Impacts to air quality: Short duration smoke during prescribed fire. Burn will not be conducted when smoke may cause adverse impact to smoke sensitive sites downwind. Service policy requires that state smoke management guidelines be adhered to. This will be coordinated and monitored by the responsible state agency. Refer to Refuge Fire Management Plan and State of Washington Smoke Management Plan.

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Appendix F. Compatibility Determinations

All secondary uses must be compatible with the mission of the National Wildlife Refuge System and the purposes of the Refuge. For purposes of this document, uses are defined as any recreational, economic/commercial, military, pest/predator control, or other use of the refuge by the public. The term compatibility was first used in 1918 in regulations developed by the precursor of the Fish and Wildlife Service, the Bureau of Biological Survey. A compatibility standard has been in use by refuges since 1937 and was reaffirmed through the National Wildlife Refuge System Improvement Act of 1997. Existing policy is described in the Refuge Manual (5 RM 20) and new policy will be developed by October 1999.

This Act stipulates that the needs of wildlife must come first and defines a compatible use as a use that ". . . in the sound professional judgement of the Director, will not materially interfere with or detract from the fulfillment of the mission of the [NWRS] or the purposes of the refuge." Sound professional judgement is defined as ". . . a finding, determination, or decision, that is consistent with principles of sound fish and wildlife management and administration, available science and resources...." Compatibility for priority wildlife-dependent uses may depend on the level or extent of a use.

The Service recognizes that these compatibility determinations are complex. For this reason refuge managers are required to consider "principles of sound fish and wildlife management" and "available science" in making these determinations (House of Representatives Report 105-106). Evaluations of the existing uses on Little Pend Oreille NWR are based on observations of refuge uses and reviews of appropriate scientific literature.

Refuge managers are charged with the conservation and protection of wildlife and habitat and pressures to increase opportunities for people to enjoy wildlife. These responsibilities and the increasing trend in outdoor recreation result in a management challenge at Little Pend Oreille NWR. How can the Refuge balance these two sometimes conflicting mandates? Recreation can degrade land, water, and wildlife by simplifying plant communities, increasing animal mortality, displacing and disturbing wildlife and distributing refuse (Boyle and Samson 1985). Recreation may also contribute to the spread of some noxious weeds.

Wildlife responses to recreational activities are complex and include both direct and indirect effects (Knight and Cole 1995). Direct effects may include death from hunting, trapping or collecting and disturbance which may result in changes in feeding, nesting, or resting behavior, or displacement to less suitable habitats. Recreationist indirectly affect wildlife by modifying habitats and contaminating their habitats with food and trash. Consumptive (e.g., hunting) and nonconsumptive (e.g., bird watching) recreational activities may affect the abundance, distribution, and demographics of some populations (Knight and Cole 1995). These effects are not well known and difficult to study in free-ranging animals. The type of activity (e.g., motorized vs. non motorized), timing of activity (e.g., breeding season vs. other times), location, frequency, and predictability (e.g., consistent vs. erratic) all influence animal responses (Knight and Cole 1991). While some species may be negatively affected by recreational activity, others may show positive responses to these activities. Common and widespread bird and small mammal species were favored by campground developments (Garton et al. 1977, Clevenger and Workman 1977 and Foin et al. 1977).

Recreational activities cannot be viewed in isolation because often, more than one activity is occurring simultaneously at any given location, complicating the evaluation of a use. For example, near Potter's Pond during spring there may be several activities occurring at the same time including fishing, camping, wildlife viewing, motorized boating, hiking, and bicycling. Addition of uncontrolled pets or unsupervised children further complicates the situation. While any one activity occurring alone may have limited effects on wildlife, the cumulative effects may be significant and harmful to wildlife.

Management restrictions or stipulations to ensure compatibility may be either direct or indirect (Vaske et al. 1995). Direct approaches include law enforcement; zoning uses; altering availability of access and campsites; requiring reservations or special use permits; restricting types of use, group size, length of stay and prohibiting uses. Indirect approaches include improving or neglecting access, providing information about opportunities or minimal impact approaches, and charging fees. Restricting the timing or spacing of uses may reduce effects to some wildlife. Reducing noise and speed of recreational activity (slow versus fast moving) may reduce disturbing effects of some recreation to wildlife (Klein 1993, Saab, 1996). Limiting access and localizing use may be more effective than dispersing visitor use for some types of recreational activity (van der Zande et al. 1984). Regardless of the approach used, effective management is necessary to reduce the effects of recreation on wildlife communities.

Compatibility determinations use the following format:

1. Station Name:
2. Establishing and Acquisition Authorities:
3. Refuge Purposes:
4. NWRS Mission:
5. Management Goals:
6. Applicable Laws, Regulations, and Policies:
7. Description of Use:
8. Anticipated Impacts on Service Lands, Waters or Interests:
9. Determination:
10. Stipulations to Ensure Compatibility:
11. Justification:

Items 1 through 5 are listed once in this document. This Appendix documents compatibility determinations for both existing uses (Alternative A) and the agency proposed action (Alternative E in *italics*).

Compatibility determinations follow for these uses:

1) livestock grazing
2) haying
3) firewood cutting, Christmas tree harvest
4) commercial timber harvest
5) hunting
6) fishing
7) motorized boating
8) off highway vehicles - dirt bikes, all terrain vehicles, snowmobiles
9) environmental education, interpretation, wildlife viewing, and wildlife photography
10) camping, swimming, picnicking
11) cross country skiing, snowshoeing, dog sledding
12) search and rescue training, hiking, scouting activity
13) mountain biking, jogging
14) horseback riding
15) berry picking, mushroom gathering, antler collecting

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Station Name: Little Pend Oreille National Wildlife Refuge

Establishing and Acquisition Authorities:

The Little Pend Oreille National Wildlife Refuge, located in Stevens and Pend Oreille counties in Washington State, was established on May 2, 1939 by Executive Order 8104. Additional lands were purchased in later years through the Migratory Bird Conservation Act.

Refuge Purpose(s):

For lands acquired under Executive Order 8104, the purpose of the acquisition is " . . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

For lands acquired under the Migratory Bird Conservation Act (16 U.S.C., Section 715d), the purpose of the acquisition is " . . . for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." Based on review of acquisition authorities and supporting documentation, the purpose for Little Pend Oreille NWR has been clarified (see Introduction Chapter in CCP/EIS). The Refuge Purpose is: To conserve habitats for migratory birds and all other native fish and wildlife.

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National Wildlife Refuge System Mission

> "To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Management Goals:

Goal 1:	Conserve, enhance, and restore native forest, riparian, in-stream, and wetland habitats representative of the native habitat diversity of northeastern Washington.
Goal 2:	Monitor, protect and recover special status species and species of management interest.
Goal 3:	Provide opportunities for wildlife-dependent recreation and education to enhance public appreciation, understanding, and enjoyment of Refuge, wildlife, fish their habitats, and cultural history.

1) Livestock Grazing

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Refuge System policy regarding livestock grazing is described in the Refuge Manual (6 RM 9).

Description of Use: Livestock Grazing
Alternative A.
Four permittees graze cattle on the refuge from June 1 through September 30. Grazing occurs on approximately 20 % of the refuge including riparian areas, meadows, former farm fields, forest openings, and low elevation forest. The Service has continued a rotational grazing program developed by the Soil Conservation Service, Washington Department of Fish and Wildlife, and grazing permittees. The stated primary objectives for the program were to improve forage quality for deer and provide a grazing system for domestic stock.

The most recent inventory of AUMs was completed in 1983 and totaled 3208 AUMs. This inventory described the total forage available, to wildlife and cattle, on 16 refuge pastures in 1983. While those were the inventoried AUMs, that total was never made available to cattle. A

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portion of it was retained for wildlife use and one unit (Starvation Flat) had not been grazed since early refuge years. Cows are rotated off pastures when pastures have a six-inch stubble height. This height was decided because, in theory, cows shifted from grass and forbs to shrubs around the same time. Between 1994 and 1998 an average of 750 AUMs were used (range from a low of 287 in 1997 to a high of 801 in 1994). Prior to 1994, as much as 1200 AUMs were used. Approximately 70 miles of fence (35 miles of interior and 35 miles of boundary fence) is necessary to maintain the existing grazing program. Permittees have completed most of the fence maintenance since 1995. See Affected Environment Chapter in CCP/EIS for additional information.

Alternative E.
Grazing may be used as a management tool to achieve specific habitat objectives. The details of how the tool would be used will be developed and discussed in the stepdown Habitat Management Plan scheduled for completion by 2005 . Some potential objectives that may use livestock include: improving spring forage quality within winter range for white-tailed deer, limiting seed production and restricting root system growth of noxious weeds (for example, using goats on leafy spurge) or undesirable plants (reed canarygrass), and to manage vegetation on old fields. Use of grazing as a tool must meet carefully developed criteria as grazing may benefit one species at the expense of another.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternative A.
Based on a 1996 grazing review, fisheries habitat surveys of the Little Pend Oreille River and Bear Creek in 1996 and 1997, and a riparian condition evaluation on 32 valley units of five refuge streams in 1996 and 1997, the annual cattle grazing program is having a negative impact on refuge fish and wildlife habitats. These surveys, conducted by Fish and Wildlife Service staff, suggest that while there may be some positive but unproven effects of grazing on forage quality for deer, the benefits of livestock grazing do not outweigh the negative effects, particularly in riparian and other sensitive habitats.

Permittees have had long-term permits on the refuge, ranging from 15 to 60 years. This creates perceived ownership and is restricted under Service policy, which requires regional director approval for grazing privileges that extend more than five years from the original date granted.

In his evaluation of livestock grazing in Western North America, Fleischner (1994) maintained that grazing may have a profound influence on plant community composition, ecosystem functioning, and ecosystem structure. These factors may in turn affect animal populations, due to livestock's effects on habitat structure. Grazing may also contribute to landscape-scale changes in plant and animal species composition.

The existing grazing system results in cattle trespass on refuge inholdings. In some cases these inholdings provide the only available forage within a given unit.

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A key issue in any grazing program is management of cattle. Grazing intensity, stocking rate, grazing season, and movement of animals between pastures all influence the outcome on habitats. Animal unit months and numbers of cattle are not as important at Little Pend Oreille NWR as how cows are managed. Impacts from grazing could be reduced if more effort was devoted to cattle monitoring and herding, more water sources developed, and more forest stands opened up to increase forage. These would all be appropriate if grazing is identified as the preferred tool for meeting a wildlife habitat objective.

Livestock grazing has had a detrimental impact to the alluvial riparian zones of both the Little Pend Oreille River and Bear Creek. Typically riparian areas constitute 1-2 % of the total land area (Ohmart 1996). While exact figures are not yet available for the LPO NWR, that ratio will likely hold true here as well. The importance of riparian areas far exceeds their availability. Birds reach higher breeding densities in these habitats than any other habitat in the contiguous United States. (Carothers et al. 1974 *in* Ohmart 1996). Many species of small mammals, amphibians and reptiles are dependant on these areas. Large mammals such as deer, moose, elk and others use them as thermal and hiding cover, travel corridors, and foraging areas. In short, the importance these areas to wildlife cannot be over emphasized.

A survey of the riparian condition of most of Bear Creek and the mainstream of the Little Pend Oreille River as it occurs on the Refuge was conducted in 1996. Approximately 5 of the 8.5 miles of Bear Creek surveyed were classified as being in unsatisfactory condition. Of the approximately 7.5 miles of the Little Pend Oreille River surveyed, about 2 miles were classified as being in unsatisfactory condition. These unsatisfactory areas were mostly in the alluvial, low gradient troughs that comprise more than 50% of the total riparian habitat occurring on the refuge. Attributes of these riparian areas that usually characterized an unsatisfactory condition included excessive stream bank erosion, deficient channel entrenchment, lowered water table, reduced extent of active flood plain, and a diminished composition of the hydric riparian species expected to occur in a fully functional riparian system (Pyle 1997)

According to Ohmart (1996), the best way to manage riparian habitats is to not graze them. The most striking difference between recovery of riparian areas with total rest by exclusion of cattle and recovery using livestock is the time involved. With managed grazing, riparian healing is twice (16-20 years) and maybe 4 times (32-40+ years) longer than exclusion (Ohmart 1996).

Fish habitat assessments of the Little Pend Oreille River and Bear Creek were conducted in 1996 and 1997, respectively. The Little Pend Oreille project surveyed about 9.5 miles of the river within the Refuge, starting at the refuges western boundary, culminating near Olson/Tacoma Creek Rd. Six reaches were intensively surveyed and the following parameters measured: water temperature, pool frequency, bank stability, sediment, frequency of large woody debris, and riparian vegetation. While there was some variation in the scores for each of these parameters in each of the 6 reaches, reach number 2, which extended from the western boundary of the refuge to the bridge at Cottonwood Campground, scored below the standards described in the Interior Columbia Basin Ecosystem Management Project (ICBEMP). This reach coincides with the low

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gradient alluvial portions of the River found to be in an unsatisfactory condition during the riparian survey. The substandard condition of this reach is attributed to past logging clearing of the valley, as well as livestock grazing and deer herbivory. The upper reaches in the higher gradient and forest areas of the Little Pend Oreille River were in significantly better condition as fish habitat, with livestock grazing, deer herbivory, timber harvest and recreational use all having some limited impact in specific areas along these reaches (Kelly-Ringel 1997).

Four reaches were designated along Bear Creek and were assessed as fish habitat in 1997. Reach 2 was a braided marsh, while reaches 1, 3 and 4 were riverine. Although several factors were discussed, the consistent theme in these three riverine reaches were the impacts livestock grazing were having on the stability of streambanks. These reaches coincide with those found to be unsatisfactory during the riparian condition survey.

Based on these two independent habitat surveys, it appears that past and present livestock grazing is having an impact on riparian function and fish habitat, especially in the low gradient alluvial valleys of the Little Pend Oreille River and Bear Creek. This is significant because riparian habitats are preferred by cattle and are grazed at a disproportionately higher intensity (Platts and Nelson 1985 *In* Omhart 1996). Platts (1990 *In* Omhart, 1996) concludes that it is extremely doubtful that any grazing can improve riverine-riparian systems or local hydrologic conditions over what nature can do in an ungrazed system.

While there may be disagreement about whether these areas are truly degraded and if that degradation is the result of livestock use, the evidence points to livestock having a negative effect on the condition of these areas. Numerous studies had shown that livestock spend 5-30 times longer in riparian areas than in adjacent uplands because of the lush vegetation, water and shade (Skolvin 1984 *in* Ohmart 1996). Cows concentrating along streams, foraging along the stream banks and crossing the stream cause extensive physical damage to the banks and channel. This, combined with the reduction or removal of sedges, grasses and woody vegetation through grazing and browsing along these banks, results in a degraded stream morphology. As the shape of the stream channel changes, the stream's ability to access its flood plain on a 1-3 year interval is impaired, diminishing its ability to dissipate its energy during high flow periods as well as recharge ground water. The loss of herbaceous and woody root systems lessens the ability of the bank to hold together and resist erosion, resulting in an increase in the amount of sediment entering the stream.

Another issue is whether livestock grazing has a significant positive impact on either forage quantity or quality for white-tailed deer and other wildlife. One of the early justifications for instituting a grazing program on the LPO NWR was that cattle grazing promoted early green up of grasses in spring and improves forage quality for white-tailed deer. This could be an important consideration especially for deer on winter range since early spring is when deer energy reserves are at their lowest level and it's also when deer diet is heaviest in grasses. Analysis of mule deer diet found that the proportion of the deer's spring diet made up of grasses was more than twice that seen for the other three seasons (Peek and Krausman 1996). The diet of white-tailed deer should be quite similar. Connolly and Wallmo (1981 *in* Teer 1996), discussing the lack of definitive information about the effects of livestock grazing and mule deer and black-tailed deer management stated: "Theory abounds, but supportive documentation of effective results is in short supply. Livestock grazing probably is beneficial to deer in some circumstances, but intentional manipulation of livestock to enhance deer range is another matter. In this area much remains to be learned." Teer (1996) felt much the same should be said about the impacts or benefits of livestock grazing on white-tailed deer.

Related to this issue is the potential for competition for food between livestock and big game. Being primarily browsers, deer diets do not significantly overlap that of cattle except during the early spring when deer are trying to recover from their annual low point in energy reserves. This is especially true of females who require increasing amount of food in preparation for fawning. The dietary overlap between cattle and white-tailed deer is generally limited since cattle diets are composed primarily of grasses which deer use sparingly (Teer 1996). Elk show a much greater dietary overlap with cattle than do deer so the competition between cattle and elk for grasses and forbs is more intense year around. However, by about mid summer grass forage becomes scarcer and cattle begin to switch their diet to increasing amounts of browse. This brings them into direct competition with both white-tailed and mule deer, and to lesser extent with elk. Browse is one of the most important food sources for wintering big game with both evergreen and deciduous woody plants comprising more than half the midwinter diet of white-tails in Montana and Idaho (Peek 1984). Since there is a limited amount of grasses available, especially on most of the upland pastures, it's likely that cattle are browsing throughout a large portion of the late summer they spend on these areas. This ultimately reduces that amount of browse available for deer in the winter.

The impact of this browsing by cattle may have negative impacts on other species of wildlife also. In their review of birds and the effects of grazing, Saab et al. (1995) found no studies that specifically evaluated the influence of livestock grazing on neotropical migrants using coniferous forests in the western United States. However, they speculated that birds most likely to be negatively effected by livestock grazing included those species dependant on herbaceous and shrubby ground cover for nesting and/or foraging. They felt that the reduction in suitable nesting and foraging habitats for ground nesting birds was a likely form of livestock- induced negative impact to migratory land birds within western coniferous forests.

Livestock grazing and browsing can also have a negative effect on ruffed grouse habitat. Ruffed grouse on this part of their range depend very heavily on the flower buds of mature aspens for winter food. Immature aspen as well as other species of woody vegetation are an important fall to spring habitat component providing visual obstruction from predators, especially around drumming sites (Cade and Sousa 1985). This important aspen component, especially the smaller diameter sizes from sprouts to about 4" d.b.h., appears to be in very short supply on the LPO NWR. Observations of aspen groves show a very low rate of reproduction. Almost all of the suckers present have been browsed heavily. While this may be the result of wildlife and domestic livestock browsing as well as other influences, there is little doubt cattle are contributing to the suppression of these stands.

Cattle preferentially graze old homesteads and natural forest openings on both upland and riparian sites. These areas have the greatest potential for expansion and regeneration of aspen and other desirable shade intolerant hardwoods. However, little aspen sprouting is seen in these areas even when parent trees are available for suckering. Sprouts that do appear are being browsed down by livestock and/or deer. These aspen inclusions are valuable habitat for grouse, deer, woodpeckers and other songbirds.

Researchers have detected a significant reduction in small mammal populations in grazed areas when compared to ungrazed. (Fagerstone and Ramey 1996) This is thought to be tied to a loss of cover from cattle foraging resulting in higher predation rates and emigration from grazed areas to ungrazed. In either case, the carrying capacity of the area for small mammals was reduced, which in turn reduces the amount of prey base available to predators such as coyotes, great-horned owls and red-tailed hawks, thereby reducing the areas carrying capacity for these carnivores.

Maintaining a grazing program on the LPO NWR has required the construction of a large number of fences throughout the refuge, especially within the alluvial river bottoms. Many of these fences are in poor condition and are not conducive to deer passage. This, coupled with the fact that most of these fences occur on traditional white-tailed deer winter range, increases their negative impact on deer. In addition, many of these fences are also obstacles to recreational users such as anglers and horseback riders.

A final concern related to grazing is the impacts brown-headed cowbirds may be having on native bird populations. Brown-headed cowbirds are nest parasites that do not build their own nest but instead lay their eggs in the nests of other passerine birds. The cowbird egg usually hatches earlier than the host eggs. The most likely result of this parasitism is the loss of the host's young. In one study of warbling vireos, 65% of the vireo nest were parasitized by brown headed cowbirds. Cowbirds evolved on the great plains, following the bison herds that provided their food by stirring up insects and grubs. By switching to domestic cattle the cowbird has expanded its range into many new areas, including northeast Washington. Both brown headed cowbirds and warbling vireos, as well as other potential host species, are found in the LPO NWR. However, early research has shown that brown-headed cowbirds will not travel more than 12 miles from agricultural areas (Saab, pers. comm.) and their cattle herds. Removing cattle from the LPO NWR could reduce this problem on the refuge.

Determination:
Alt A. This use is not compatible.

Alt E. This use is compatible.

Stipulations to insure compatibility:
Alternative E
Review habitat management options and use grazing when and if it is the most efficient method for managing vegetation. Intensively manage herds to accomplish set objective and remove cows or other stock once desired results are achieved. Using goats to manage seed production of leafy spurge is one example of grazing as a management tool.

Justification:
Alternative A
Grazing policy allows use of livestock grazing as a management tool where it enhances, supports, or contributes to wildlife habitat objectives. It may be allowed on a secondary basis, where it does not conflict with established refuge objectives. The benefits of the existing annual grazing program do not outweigh the negative effects associated with the program. To be used as a secondary objective would require intensive management. Restoration of native forest and riparian ecosystems on Little Pend Oreille NWR may be best achieved without cattle.

Alternative E
Restoration of native forest and riparian ecosystems on Little Pend Oreille NWR may be best achieved without cattle, however, in altered environments, like old fields where the A soil horizon is gone, livestock grazing may be an effective tool to manage nonnative vegetation. This enables the refuge to retain grazing as a tool for vegetation management under specific controlled conditions.

2) Haying

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Cropland management policy is described in 6 RM 4. Haying policy is described in 6 RM 5.6 and 6 RM 9.

Description of Use: Haying
Alternatives A and *E*
Two refuge fields, of approximately 8 and 23 acres, straddle Slide Creek on the southwestern corner of the refuge. These fields have been planted with alfalfa and one crop hayed by a refuge neighbor through a special use permit for many years. There are several former farm fields, many cleared in the early 1900s, that could be planted to provide forage for wintering deer. This would provide productive habitat as well as reduce noxious weed spread in some fields.

Anticipated Impacts on Service Lands, Waters or Interest:
This use perpetuates non-native species and requires continued planting and may require harvest when certain species are planted. These "costs" may be outweighed by the benefits of increasing productive wildlife habitat and restoring nutrients to poor quality soils.

Determination:
This use is compatible.

Stipulations to insure compatibility:
Alternative E
Continue to manage the use through special use permits. Monitor soil productivity and ability of soil to support native species. Use adaptive management to minimize management and farming costs and evaluate if natives can be established.

Justification:
Wildlife use of refuge alfalfa fields is high, particularly by deer and gallinaceous and seed-eating birds. Use of legumes adds nitrogen to the soil which may be limiting in some old farm fields.

3) Firewood Cutting, Christmas tree harvest

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Firewood cutting policy is described in 5 RM 4.8 and 6 RM 3.8.

Description of Use: Firewood cutting, Christmas tree harvest
Alternative A
In 1998 the refuge issued 40 firewood cutting permits for cutting between August 1 and November 1. Each permittee was allowed to cut up to two cords of downed wood within 200 feet of a designated road. Roads selected had a considerable amount of downed material from the severe winter of 1996-1997 which increased risks of stand replacing fire. Providing firewood permits may be continued if downed wood along roadsides is excessive and increases fire hazard. It may also be used following commercial harvest to clean any excessive debris.

A limited number of permits have been made available for Christmas trees. A local scout troop cuts approximately 200 fir and pine trees from overstocked stands each year. Individual trees may be cut for personal use with a permit.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternative A
Firewood cutting permits set specific conditions and locations and minimize negative impacts for this use. Some staff time is necessary to prepare the permits but this is outweighed by the fire hazard reduction and road maintenance benefits. Christmas tree cutting areas are typically overstocked and in need of thinning.

Determination:
Alt. A & E These uses are compatible.

Stipulations to insure compatibility:
Alternative E
Standing dead trees, which are valuable wildlife habitat components, will not be cut. Locations for cutting will be designated prior to issuing permits. All firewood cutting will be restricted to locations and seasons that have a minimal effect on breeding birds and other wildlife. Institute fee to cover administrative costs of firewood cutting.

Designate areas that require thinning for Christmas tree cutting.

Justification:
Both of these uses provide wildlife habitat and community benefits.

4) Commercial Timber Harvest

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Forest management policy for the Refuge System is described in 6 RM 3 and includes commercial contracts.

Description of Use: Commercial Timber Harvest
Alternative E
Commercial contractors will be used for some forest management activities including precommercial and commercial thinning and selective harvest. The purposes of each treatment are part of an effort to restore forest structure and composition to more natural conditions and may include any one or more of the following objectives:

Increasing the proportion of mature forest
Maintaining mature forest components

Preparing stands for reintroduction of low-intensity prescribed fire.

Reducing tree densities in overstocked stands, favoring mature and over-mature trees and promoting diameter and height growth in the remaining stand.

Each timber sale will be marked for cut trees and most marked trees will be less than 70 years old. For all sales of merchantable timber, the refuge would post a public notice in the newspaper. Special use permits will be issued to successful bidders. See Appendix E of the CCP/EIS for three silvicultural prescriptions for commercial harvest.

Anticipated Impacts on Service Lands, Waters or Interest:
The effects of harvest operations are described in the Environmental Consequences chapter of the draft CCP/EIS.

Determination:
This use is compatible.

The following stipulations are required to ensure compatibility:
Alternatives A & E
Special provisions will be developed and enforced through the Special Use Permit process for each sale. All State Forest Practices regulations and refuge objectives must be followed (e.g., no harvest within 200 feet of streams, etc.). Most sales will occur between September and March to minimize disturbance to breeding and nesting wildlife and minimize soil impacts. Harvest may be postponed during severe winter weather to reduce disturbance to wintering deer.

Sales shall be exclusively cut tree marked. Only those trees designated for cutting shall be cut and removed. All trees shall be cut as close to the ground as safety, terrain and equipment capabilities allow. Decking and loading shall be accomplished in such a manner that safe management, and general public access shall not be restricted. No clearing shall be permitted for decking and loading. Decking and loading shall occur in existing openings where such operations are feasible and safe. Most decking will occur along existing roads.

Justification:
It is not practical for refuge staff to complete commercial forest harvest operations to achieve forest management objectives. The specialized equipment, the money to purchase this specialized equipment, or expertise for equipment operation is not available. In addition to equipment, and operational expertise, local contractors have good knowledge of mills, road systems, weather patterns and other factors affecting timing and success of harvest operations.

5) Hunting

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing hunting on refuges in described in 8 RM 5.

Description of Use: Hunting

Alternative A

The area within the LPONWR boundary, north of Bear Creek Road to the Narcisse Creek Road intersection, Narcisse Creek, and Blacktail Mountain Road opens for all established state hunting seasons on September 1 and remains open until December 31. The area south of the preceding boundary opens for all established state hunting seasons on October 1 and remains open until December 31. Legal species include deer, black bear, elk, cougar, grouse, moose, raccoon, bobcat, rabbit, coyote, and migratory waterfowl. Most hunting pressure is associated with grouse, deer, and bear. The refuge-wide hunting closure, from January 1 through August 31, and the September closure, south of Blacktail Mountain Road, were established for Air Force Survival School training.

Waterfowl hunting is allowed only on refuge lakes. All streams are closed to waterfowl hunting. There are additional hunting closures within one-quarter mile of headquarters and campgrounds.

Alternative E.

Additional hunting opportunities may be available if the Air Force hunting closure is modified. Refuge will evaluate adding a spring turkey hunt and primitive weapon big game hunts on portions of the refuge in August and September. These will require additional compatibility reviews and adjustments to Code of Federal Regulations.

Anticipated Impacts on Service Lands, Waters or Interest:

Harvests of big game, grouse, and waterfowl are not expected to have a major effect on refuge populations. Deer hunts are the most popular refuge hunts. As an important wintering area, the refuge often does not harbor the majority of its wintering ungulate populations until December, after rifle hunts close. Ungulates wintering on LPONWR summer north, south, east and within the refuge. By harvesting approximately 100 deer per year, deer populations have maintained a relatively stable condition. Monitoring refuge hunts and hunter harvest requires considerable staff time. Late season hunts may result in excessive hunting pressure, depending on a variety of population or weather factors not possible to predict.

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Washington Department of Fish and Wildlife and other state wildlife agencies strive to regulate hunting so that harvest does not reduce populations to unsustainable levels. Hunting may be either compensatory or additive to natural mortality (Anderson, S. 1995). Compensatory mortality describes the effect hunting may have on a population when it substitutes for other forms of mortality (disease, competition, predation, severe weather, road kills, et cetera). Additive mortality describes hunting that compounds natural mortality.

Hunting may alter the ungulate population structure when the largest animals with the biggest racks are targeted by hunters. Animal behavior and distribution may be altered in hunted populations. Conception dates in a heavily hunted elk population in Colorado coincided with hunting dates, indicating that reproductive behavior may be influenced by hunting (Squibb et al. 1986). Nocturnal feeding behavior may become more prevalent in ungulates and waterfowl during hunting seasons (Douglas 1971, Madsen 1988 *In* Knight and Cole, 1995).

Small et al. (1991) found hunting mortality on public hunting areas to be significantly higher in both adult and juvenile ruffed grouse populations in central Wisconsin than mortality on private land. This was surmised to be due, in part, to increased hunting pressure and better road access on public land.

Modern hunters are using more sophisticated tools to access their quarry. Motorized all-terrain vehicles, high powered rifles and scopes, and global positioning systems are some of the tools that increase the accessibility of habitats to hunting. Disturbance factors from vehicles may add to disturbance associated with hunting.

Harvest of predators including cougar, bobcat, coyote, and perhaps bear may be altering predation which is a natural ecological process. Because relatively few predators are known to be legally taken, it is not clear whether predator prey feedback mechanisms are altered significantly.

Unregulated camping associated with hunting is treated under a separate camping compatibility determination.

Determination:
A & *E* This use is compatible.

Stipulations to insure compatibility:
Alternative E.
Evaluate road density and its effect on refuge ungulates and other species. Use road closures as a way to increase animal security, reduce road hunting, improve hunt quality, and allow for immigration of animals from less accessible areas. Enforce restrictions on all-terrain vehicles for able-bodied hunters. Consider more doe harvests if populations warrant. Maintain law enforcement patrols to insure safety and compliance. Collect harvest data using hunter interviews, wing barrels, deer tooth collection and other methods. Modify bag limits or seasons

if population data warrant. Monitor late season deer rifle hunts for excessive pressure. New hunts (turkey, etc.) must be evaluated individually for compatibility. Evaluate potential effects of predator hunting on ecosystem function.

Justification:
The refuge is a destination white-tailed deer hunting area. A few landowners adjacent to the refuge complain of crop losses associated with deer depredation on alfalfa fields. Hunting is a legitimate recreational activity when practiced within refuge guidelines and state seasons and regulations. Except during extremes of weather, most wild animals produce more animals than their habitats can support. These surplus animals are removed by mortality factors that regulate population numbers within the limits of the habitat. Hunting can be used to remove a portion of these excess animals that would otherwise be lost to other factors including diseases, accidents, parasites, and predation. Controlled hunting keeps wildlife populations within the carrying capacity of the habitat and provides game meat and recreation for hunters. Hunting does not conflict with refuge purposes.

6) Fishing

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing sport fishing on refuges is described in 8 RM 6.

Description of Use: Sport Fishing
Alternatives A & E
Refuge anglers fish for trout in stocked lakes (Bayley, Potter's, and McDowell) from the last Saturday in April through October. Stream and beaver pond fishing opens on June 1 and extends through October. See Affected Environment Chapter for additional information.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternatives A & E
Impacts associated with recreational fishing include vegetation trampling, littering, problems with discarded fishing line, introduction and spread of exotic aquatic and terrestrial plants, and out-of-control dogs. The presence of humans also affects some sensitive fish and wildlife. Humans approaching feeding sites, breeding areas, or resting cover may disturb fish and wildlife. Sensitive species may avoid refuge lakes due to human disturbance associated with recreational fishing. Despite recreational disturbance, broods of Canada geese, mallards, teal, golden eyes,

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mergansers, and red-necked grebes are seen yearly at refuge lakes. Survival of these broods, however, could be affected by recreational disturbance.

Diving ducks (goldeneye, ruddy duck, mergansers, ring- necked duck, bufflehead, and redhead) tend to be more susceptible to disturbance than dabbling ducks (mallard, teal, pintail, widgeon, shoveler, and wood duck).

Fishing as a solitary and stationary activity tended to disturb terrestrial vertebrates less than hunting or motorized boating (Tuite et al. 1983) but is cited commonly in the literature as disturbing to waterfowl particularly during the breeding season. Waterfowl production, habitat use, and susceptibility to predation may be influenced by the presence of anglers as reported by DeLong and Schmidt (1998) in a literature review of the effects of recreation on wildlife and wildlife habitat. Jahn and Hunt (1964) studied breeding ducks in Wisconsin and learned that despite the presence of suitable nesting habitat, heavy recreation pressure prevented nesting. Surface area of open water may influence waterfowl nesting disturbance with increasing disturbance on small water bodies (Reichholf 1976). In this German study, a single angler prevented ducks from establishing territories and selecting nest sites when the amount of open water was less than 2.5 acres (1 ha).

These studies suggest there may be some reduced habitat value for water birds from recreational fishing at Refuge lakes. The extent of this problem is unclear and may be more of a problem at Potter's Pond than at McDowell Lake and Bayley Lake. The small size, presence of motorized boats and bank fishing may increase disturbance to birds. Motors are not allowed on Bayley or McDowell Lakes. Most anglers use belly boats. These two lakes are larger and have very little shoreline fishing. To assess how much effect recreational fishing has on Refuge lakes, a study of similar lakes without spring fishing seasons is needed.

Stocking non-native fish in refuge lakes may alter aquatic communities, influence nutrient dynamics and productivity, and modify food webs (Bouffard and Hanson 1997).

Determination:
This use is compatible with stipulations but further study is warranted.

Stipulations to insure compatibility:
Alternative E.
Improve educational and regulatory signs and information near heavy use areas. Eliminate motorized boats on Potter's Pond. Limit bank fishing to the south side of Potter's Pond. Relocate camping areas a suitable distance away from lakes. Have law-enforcement qualified refuge staff monitor this use, throughout the season, with priority attention on weekend use. Evaluate cumulative impacts associated with fishing and camping near lakes and streams. Control children and pets near lakes and streams. Set up a statistically sound study with controls to evaluate the affect of fishing and other recreational activity on wildlife use at the

lakes. Consider postponing the opening dates of the fishing season on refuge lakes until waterfowl nesting is complete. Find a source for native fish for refuge lakes.

Justification:
Most waterfowl use of refuge waters occurs during spring and fall migration. Waterfowl and waterbird information available to date, does not suggest that the existing fishing program substantially affects breeding birds. If it is learn through monitoring that the fishing program significantly affects the refuge's potential to support breeding birds, the Refuge must make appropriate changes. If fishing is discovered to negatively affect use of refuge lakes by waterfowl, modifications to the fishing seasons on refuge lakes will be necessary.

7) Motorized Boating

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Description of Use: Motorized boating
Gas and electric-powered motorized boats are allowed and used on Potter's Pond by anglers.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternative A
Gas powered motors are noisy and disturbing to water-depend birds and some terrestrial wildlife. These traits also increase the potential to disturb other recreationists. They add fossil fuels to the water and can be unpleasant smelling. Electric motors do not add fossil fuels to the lake and are relatively quiet but may disturb birds.

Determination:
Alt. A. This use is not compatible.

Stipulations to insure compatibility:
Alternative E. Eliminate gas-powered motors on Potter's Pond.

Justification:
Potter's Pond is a family fishery attracting primarily seniors and families with children. These users are important and should be retained. This lake provides some variety of fishing opportunities on the refuge. Eliminating gas-powered motor boat use on this lake will reduce noise and fuel pollution on the lake but still allow use of electric motors and non-motorized boats.

8) Environmental Education, Interpretation, Wildlife Viewing, Wildlife Photography

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57). National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c

Policy governing environmental education, interpretation, wildlife viewing, and wildlife photography is included in the "other recreational uses" section of the Refuge Manual (8 RM 9)

Description of Use: Environmental Education, Interpretation, Wildlife Viewing, Wildlife Photography

Use of the refuge for environmental education and wildlife photography is limited. The extent of wildlife viewing is unknown, although the refuge is included in the Washington State Wildlife Viewing Guide and several state birding guides. More resources will be dedicated to these priority uses in the future. See Implementation Appendix of Draft CCP/EIS

Anticipated Impacts on Service Lands, Waters or Interest:
Alternatives A & E
The effects of these activities depend on group size, location, season of use, and duration of the activity. They may cause limited and temporary disturbance to wildlife. As plans are made for site development, compatibility will be reassessed. Areas considered for site development include McDowell Lake Overlook, Winslow Logging Railroad Interpretive Trail, Kiosks at Refuge Headquarters and State Highway 20, and key historic sites in core of refuge.

Determination:
These uses are compatible.

Stipulations to insure compatibility:
Work closely with school and youth group leaders to build awareness of using the refuge as an environmental education site. Suggest specific sites, lessons, and activities for group use. Monitor environmental education activity and wildlife photography. Provide wildlife viewing tips to refuge users.

Key messages for the public will include the following:

Inform all refuge users about ethics and responsibilities of wildlife viewing.

Site development plans will incorporate additional stipulations to insure compatibility.

Justification:
These activities have the potential to gain advocates for wildlife and habitat protection. Ultimately, these activities may expand support for refuge programs. By encouraging people to learn more about wildlife, the Refugemay be creating new constituents for wildlife protection and enhancement.

9) Camping, Swimming, Picnicking

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing camping, swimming, and picnicking is described in the "other recreational uses" section of the Refuge Manual 8 RM 9.

Description of Use: Camping, Swimming, Picnicking
Camping occurs within campgrounds and in dispersed sites from mid April through the late deer hunting seasons (November). The refuge is a popular destination camping area. Many of the people who camp here do not engage in fishing, hunting, or wildlife viewing. They are here primarily to camp. This type of user is most common between Memorial Day and Labor Day weekends particularly during summer and fall weekends. See CCP Chapter 4 for description of camping.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternative A
The majority of refuge campers seek a peaceful outdoor experience. However, there are campers who use camping as an opportunity to party. Loud motors, music, and uncontrolled dogs associated with some refuge camping disturb wildlife and detract from a peaceful outdoor experience for other refuge users. Irresponsible use of fire and damage to standing live or dead trees is most frequent near campsites. Use of detergent, soap, and toothpaste in streams and lakes harms fish and other aquatic life. Human and animal waste creates unsanitary conditions in heavy use areas. Campers often leave garbage, trash, and other undesirable items (straw, couches, chairs, etc.). Illegal removal of natural objects (plants, antlers, live animals, etc.) and cultural objects may result from camper visits. Creation of "improvements" (lean-tos, tables, chairs, game poles, etc.) and alteration of the site (trenching) are also byproducts of unregulated camping.

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Within the five traditional campgrounds there are two problems occurring: riparian degradation and user-expansion. Pets accompanying campers have the potential to chase and kill wildlife. At three camp areas, users dam the stream to create a swimming hole. During hot summer days, visitors often place their lawn chairs on the stream bank or in the stream for sunbathing. These areas are also used for dishwashing and bathing.

Unregulated camping results in inappropriate use, tramples vegetation (particularly herbaceous and shrub layers), and devalues some sensitive wildlife habitats. According to Sun and Walsh (1998), if not well- managed, camping can adversely affect the values of natural and semi-natural resources. Recreation can degrade land, water, and wildlife by simplifying plant communities, increasing animal mortality, displacing and disturbing wildlife and distributing refuse (Boyle and Samson 1985). It may also affect wildlife through trampling of habitat (Liddle 1975) and animal disturbance (Ward et al. 1973). One night of camping was sufficient to cause evident impact in four vegetation types (Cole 1995). This author suggests that confining camping to a small number of campsites versus dispersing camps across a larger area reduces the impacts of camping. Another study evaluated the impacts of camping on soil and vegetation in Delaware Water Gap National Recreation Area and found that an open-canopy grassland vegetation type was more resistant to trampling than a forb-dominated forest vegetation type (Marion and Cole 1996). Camping on a military camping area in Missouri (Trumbull et al. 1994) resulted in reduction in the density and species richness of overstory and understory plants, increasing bare ground and reduction in litter accumulation. Camping-induced soil disturbance may provide conditions that favor weed infestations. Food from campsites may increase small mammal densities (Clevenger and Workman 1977 and Foin et al. 1977).

Camping in riparian areas may also result in increased runoff into streams due in part to exposed soil and reductions in vegetation (Green 1998). Water quality in streams, measured by total coliform bacteria counts adjacent to camps, was negatively affected by weekend camp site use that revealed higher coliform counts (Christensen, et al. 1978). In this western Washington study, bacteria were rapidly transmitted to the river water, even in dry periods. This is of concern since all refuge dispersed riparian camp sites lack sanitary facilities and human waste is deposited on the ground around the site.

In their study comparing avian use of campground and noncampground riparian sites Blakesley and Reese (1988) found that differences in avian community composition appeared related to nesting substrate, cover, and foraging substrate. Species that nest in trees, with a few exceptions, were closely associated with campgrounds while those that nest on the ground, or in shrubs, or forage on the ground were closely associated with noncampground sites. Forest bird species sensitive to human disturbance may avoid campgrounds while more common and widespread species favor them (Garton et al. 1977). In her study of study of land use effects on breeding birds on the Snake River, Saab (1996) found that overall bird abundance was significantly reduced in recreation areas while species richness and composition were similar among land use types.

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Picnicking does not appear to create any special problems and is most often associated with other uses, such as camping, hunting, fishing, or wildlife viewing.

Alternative E
Camping will occur only in campgrounds between April 15 and October 15. Designated dispersed sited may be used during deer hunting seasons. There will be no camping on the refuge from January 1 through April 15. Improvements to include provision of drinking water and accessible toilets will be made. A camping fee will be collected at designated sites.

Determination:
Use is compatible in designated sites and with criteria defined in stipulations, listed below.

Stipulations to insure compatibility:
Alternative E
Camping will be allowed only in the five refuge camp grounds (Cottonwood, Bear Creek, River Camp, Potters Bayley, and Horse Camp) outside of established hunting seasons. Dispersed camping may be appropriate during the deer hunting season because vegetation is not actively growing and breeding seasons are complete. Designated dispersed sites will be available to hunters for the rifle deer seasons only. Dispersed sites within 200 feet of meadows, streams, lakes, and wetlands will be closed and naturalized. In campgrounds with user expansion and riparian degradation, steps will be taken to naturalize expansion areas and restore riparian habitats. This will necessitate permanently closing a few campsites within three campgrounds for restoration. Develop a site plan to reduce impact to wildlife from all recreational activity near Potter's Pond and Bayley Lake. This may include eliminating camping at these lakes.

Investigate charging fees for all refuge camping to support this program. Designated staff will be on duty during all weekends between the first weekend in April through November to monitor weekend public use. An education campeign addressing appropriate social behavior for refuge camping will be developed and implemented. This program will reinforce appropriate behavior and eliminate unwanted activities and behaviors disturbing to wildlife and other refuge users. It will encourage responsible use of camp fires and discourage damage to trees, ground vegetation, stream hydraulics, and terrestrial and aquatic life. Pets must be under control at all times on the refuge.

In the step down public use management plan a camping program that supports the wildlife-dependent uses will be developed. This could result in a very different camping program. Recruit volunteers to serve as camp hosts to spread the word about wildlife-friendly camping.

Justification:
Camping is probably the most family-oriented activity occurring on the refuge. For many families it is their primary means of outdoor recreation and their primary introduction to wildlife enjoyment. While it is not a wildlife-dependent use, it could provide opportunities for wildlife interpretation and education.

10) Cross country skiing, Snowshoeing, Dog sledding

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.668dd-ee). Regulations adopted by the U.S Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing cross country skiing, snowshoeing, and dog sledding is described in the "other recreational uses" section of the Refuge Manual 8 RM 9.

Description of Use: Cross country skiing, snowshoeing, dog sledding

These uses are variable from year to year, depending on availability of snow. In heavy snow years the Refugeestimate there may be as many as 250 use days per year for skiing, and fewer than 100 use days per year for snowshoeing and dog sledding. Most of this use begins near the county roads which are plowed and occurs in the core of the winter range.

Anticipated Impacts on Service Lands, Waters or Interest:

These activities have the potential to displace wildlife during a time of year when they are most vulnerable. Cross-country skiing has been shown to move elk in Yellowstone across drainages and into steeper less desirable habitats (Cassirer et al. 1992). Little information is available on the effects of dog sledding on wildlife but disturbance from the dogs themselves may be a negative factor.

Determination:

These uses are compatible at their existing levels but could become incompatible if increased significantly.

Stipulations to insure compatibility:

Alternative F

Monitor these uses during moderate to heavy snow years and restrict use when warranted. Closing gates during months when big game are most vulnerable will reduce disturbance from dog sledding.

Justification:

These uses are not believed to negatively affect the refuge purposes at the levels they are currently occurring. They could have some negative affects on wintering deer, particularly during severe winters.

11) Off-highway vehicles - dirt bikes, all terrain vehicles, snowmobiles

Applicable Laws, Regulations and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57). National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing off highway vehicles is covered in the Off-road vehicles section of the Refuge Manual 8 RM 7.

Description of Use: Off highway vehicles - dirt bikes, all terrain vehicles, snowmobiles

With the exception of snowmobiles, off road vehicles are not allowed on the refuge. However some off-road vehicle use does occur since there has been little enforcement. Licensed off-road vehicles are allowed on designated roads but some illegal off-road use does occur. Most of this may be due to the fact that regulation signs are lacking at all refuge entrances. Snowmobile use has been allowed on Olson Creek Road and Blacktail Mountain Road, primarily because of the Snowpark Parking Lot near at the intersection of Highway 20 and Olson (Tacoma) Creek Road and the mixed Stimson, DNR, and refuge ownership along Olson Creek Road. This road is the primary route to Calispell Mountain, an area very popular with snowmobilers. During moderate to heavy snow years, Blacktail Mountain Road gets regular use by snowmobiles.

Anticipated Impacts on Service Lands, Waters or Interest:

Motorized off road vehicles are disturbing to wildlife and may have impacts to vegetation and soils when used off of established roads during the growing season. Loud motors detract from the quality of other forms of refuge recreation. There are studies showing snowmobile disturbance increases the home range sizes of wintering ungulates and increases deer metabolism. Moen et al. (1982) found that captive white-tailed deer increased heart rates in response to controlled tests of the effects of disturbance by snowmobiles and did not habituate to this disturbance. Peak heart rates averaged between 2.5 and 2.9 times the normal rate, depending on whether the snowmobile moved tangentially to or circled the deer. Dorrance et al. (1975) studied white-tailed deer disturbance from snowmobiles and found increased home ranges sizes and increased movement and displacement of deer along snowmobile trails. Effects of snowmobiling on ungulates may be influenced by the ungulate species, intensity of sport hunting, type of vegetation, and season (Freddy et al. 1986).

Snowmobiles can reduce the insulations properties of snow for small mammals (Hammitt and Cole 1987). Snowmobile trails provide access to high elevation habitats for species such as coyotes and bobcats that otherwise would not use these habitats during winter. Increased competition from these predators during late winter may be detrimental to lynx and other forest carnivores dependent on high elevation habitats when food availability is low and lynx are nutritionally stressed (Koehler and Aubrey 1994).

Snowmobile use hinders the solitude of the refuge for winter visitors.

Determination:
These uses are not compatible.

Justification:
These uses are not dependent on wildlife and should not be allowed on the refuge in areas where the Refuge has sole jurisdiction. Law enforcement patrols will be necessary, particularly on weekends. In areas of mixed ownership, work with adjacent property owners to minimize the disturbing effects of these uses using informational and regulatory signs and gates.

12) Search and rescue training, hiking, scouting activity

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing search and rescue training is described in 8 RM 15. Hiking policy is covered in 8 RM 9.

Description of Use: Search and rescue training, hiking, scouting activity.

Search and rescue training is conducted on the refuge by two separate groups, one from Spokane and one from Stevens County. Both groups conduct a few training sessions per year and use a refuge map and compass course. During most weekends when the groups train they use one of the refuge campgrounds.
Hiking occurs along roads and some trails.
Scouts use the refuge in small groups for campouts and merit badge completion.

Anticipated Impacts on Service Lands, Waters or Interest:
These activities, when conducted responsibly, may create minor and temporary disturbances to wildlife. At the current level of use, these activities are not expected to materially interfere with refuge purposes.

Determination:
These uses are compatible.

Stipulations to insure compatibility:
Alternative E
Develop special use permit for search and rescue groups. Encourage participants to take part in refuge-beneficial projects (for example, planting trees, removing barbed wire, handpicking weeds, removing trash). Monitor these uses and provide information to users on expectations for appropriate activities and behavior on a wildlife refuge.

Justification:
Having search and rescue groups familiar with the refuge is very helpful when there is a lost visitor. Scout use in small groups is appropriate and may create advocates for wildlife.

13) Horseback riding

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L. 105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. 668dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing horseback riding on refuges is covered in the "other recreational uses" section of 8 RM 9.

Description of Use: Horseback riding

Horseback riding is a one of the most popular recreational activities on the refuge receiving approximately 5000 use days per year. Some riders use the refuge for day rides while others camp and spend several days. Day use riders park along refuge roads or in campgrounds. Roads, trails, and cross-country travel are commonly used. Almost all camps, including dispersed sites, have been used by campers with horses. River Camp, Cottonwood Camp and Horse Camp are the most popular camps for horse campers.

There is a yearly ride that has occurred on the refuge for at least 10 years known as the Arden Old Timer's Rodeo Ride. This ride takes place in mid-May and attracts between 100-150 riders. Some of the riders camp in a group camp near Cottonwood Camp while others trailer horses and leave the refuge at the end of the ride. The Arden Fire Department serves breakfast to riders at the refuge. This ride follows refuge roads and trails. A special use permit is issued yearly for the ride.

Anticipated Impacts on Service Lands, Waters or Interest:

Alternative A

Impacts from horses depend on the number of riders and horses, the season of use, and location of use. The shearing force of shoed horses on soil and vegetation may be significant in certain soil types. Horses are one of several domestic and wild animal vectors of noxious weed seeds. Impacts may be multiplied when more horses are present. In refuge campgrounds, where horses may be confined, the impacts include girdling of trees, trampling of vegetation, animal waste, introduction of weeds through hay, and damage to streambanks and lake shores where horses are watered. Tying horses to trees or shrubs or confining them in wet areas has caused some irreparable damage in refuge camps. Other users may not appreciate some of the by products of horse use. Along refuge trails in wet areas, horses make large holes in saturated soils. At stream crossings that are not armored by rock, horse use has trampled vegetation, destabilized soils and caused sedimentation. Cutting switch backs or creating several routes to access a trail also occurs near popular riding areas. Cross country riding encourages uncontrolled use and may spread weed seeds. Some users even ride within streams which affects the stability and integrity of aquatic life.

Determination:

This use is compatible.

Stipulations to insure compatibility:

Alternative F

Develop equestrian plan with the involvement of horse users. Develop partnerships with organized riding groups to offset costs associated with this use. Encourage participants to take part in refuge-beneficial projects (for example, planting trees, removing barbed wire, handpicking weeds, removing trash) versus only projects for their benefit (e.g., trail clearing). Develop a fee system or some kind of user-maintained effort to support this use. Eliminate cross-country riding. Avoid trails through wet areas until they are dry. Designate and map roads and trails available for riding from April 15 through October 15. Develop parking areas for day use. Designate and improve one camp for horse users. Require high lines or temporary corrals. Require weed-free hay or pelletized feed in horse camps area and recommend feeding these to horses one day prior to riding on refuge. Restore damaged areas and identify appropriate crossings and watering areas. Remove animal waste products. Designate responsible riders for group use monitoring. Discourage new large group rides.

Justification:

This family-oriented use offers a unique way to view wildlife and see the beauty of the refuge. While it is technically not wildlife-dependent, horseback riding is not anticipated to interfere with refuge purposes.

14) Collecting - berry picking, mushroom gathering, antler collecting, etc.

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing collecting on refuges is described in 7 RM 13.

Description of Use: Collecting - berry picking, mushroom gathering, antler collecting, etc. The extent of these uses is unknown but is thought to be incidental to other recreational uses such as camping, wildlife viewing, and hiking. There are antler hunters who visit the office each winter but these may amount to less than 10 use days per year. Refuge staff have met children planning to remove frogs or snakes from the refuge for pets.

Anticipated Impacts on Service Lands, Waters or Interest:
At the levels of use, these collecting activities have minimal impact but do remove important food items for some wildlife.

Determination:
This use is not compatible.

Justification:
Berries are important foods for birds, bears, coyotes, and small mammals. Antlers are eaten by rodents and provide necessary calcium. Those items that are not eaten and recycled and used by other living things.

15) Mountain biking, Jogging

Applicable Laws, Regulations, and Policies:

National Wildlife Refuge Improvement Act of 1997 (P.L.105-57), National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C.688dd-ee). Regulations adopted by the U.S. Fish and Wildlife Service concerning access to and use of refuges are codified in Title 50, Code of Federal Regulations, Chapter 1 subchapter c.

Policy governing biking and jogging on refuges is covered in the "other Recreational uses" section 8 RM 9.6.

Description of Use: Mountain biking, jogging

There are small groups and individuals who ride mountain bikes on the refuge. Most known use occurs along roads.

There is a limited amount of jogging known to occur on the refuge.

Anticipated Impacts on Service Lands, Waters or Interest:
Alternative A & E.
At the existing levels of use, these activities are believed to have minimal impacts. As long as they occur along roads they are not disturbing to refuge habitats. They may temporarily displace wildlife but not more than other road uses. Some joggers and bikers clear fallen logs from refuge roads without coordinating with the refuge manager. If they were cleared to a specific standard (at least one vehicle width for fire maintenance roads) then staff would have less work opening roads in the spring and summer.

Determination:
These uses are compatible.

Stipulations to insure compatibility:
Alternative E
Monitor the use levels of these activities regularly and provide controls, if warranted. Provide information about where and when riding is allowed. Prohibit cross country and game trail use of bicycles. Discourage users from clearing roads for these uses without permission of refuge manager.

Justification:
Neither of these uses is dependent on the presence of wildlife but neither is expected to materially interfere with refuge purposes.

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Appendix G: Fire Management Plan

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LITTLE PEND OREILLE
NATIONAL WILDLIFE REFUGE
FIRE MANAGEMENT PLAN

Prepared by: Date:

Reviewed by: ________________ Date: ____________

Approved by: Date: ____

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I. Introduction

The development of this Fire Management Plan (FMP) was undertaken both to incorporate the latest fire management policy directives, as delineated in the Federal Wildland Fire Management Policy and Program Review , Final Report- 12/18/95, and to satisfy requirements of 910 DM 1-3 and 621 FW 1.1. It will also serve to update the existing FMP to meet present Service policy requirements and refuge management objectives. Service policy requires that all refuges with vegetation capable of sustaining a fire develop a FMP. In addition, all Service lands using prescribed fire must have an FMP.

This FMP is a step-down plan contained within the Little Pend Oreille NWR Comprehensive Conservation Plan (CCP) and is essential as a tool in achieving the resource management objectives delineated in the CCP. The CCP, and is essential sub-sections within the CCP meet NEPA/NHPA compliance. As such no further NEPA documentation will be necessary to implement this plan.

Authorities for implementing this plan are as follows:

1. 42 Stat 857; 16 USC 594, *Protection Act of September 20, 1922*

2. 47 Stat. 417; 31 USC 315, *Economy Act of June 30, 1932*

3. 69 Stat. 66, 67; 42 USC 1856, 1856a and b, *Reciprocal Fire Protection Act of May 27, 1955*

4. 80 Stat. 927, 16 USC 668dd-668ee, *National Wildlife Refuge System Act of 1966 as amended*

5. 88 Stat. 688, 43 USC 1601, *Alaska Native Claims Settlement Claims Act of December 18, 1971*

6. 88 Stat. 143, 42 USC 5121, *Disaster Relief Act of May 22, 1974*

7. 88 Stat. 1535; 15 USC 2201, *Federal Fire Prevention and Control Act of October 29, 1974*

8. Pub. L. 95-244, as amended by Pub. L. 97-258, September 13, 1982, 96 Stat. 1003; 31 USC 6301-6308, Federal Grants and Cooperative Act of 1977

9. 94 Stat. 2371, Alaska National Interest Lands Conservation Act of December 2, 1980

10. 96 Stat. 837, Supplemental Appropriation Act of September 10, 1982

11. Pub. L. 100-428, as amended by Pub. L. 101-11, April 7, 1989, Wildfire Suppression Assistance Act of 1989

12. Departmental Manual, 910 DM 1-3, Wildland Fire Suppression and Management, Fire Protection and Assistance, and Wildfire Control and Management-Alaska

13. Departmental Manual, Series: Public Lands, Part 620 - Wildland Fire Management

14. National Wildlife Refuge System Improvement Act of 1997, (PL 105-57)

Purpose

The Little Pend Oreille NWR (LPO) was established through Executive Order 8104 "... as a refuge and breeding ground for migratory birds and other wildlife..." and "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act)

Rehabilitation of degraded natural resources and protection of white-tailed deer winter range were two primary underlying goals leading to the establishment and management of the Refuge

The above purposes set the stage for identifying the primary resource values which will be addressed through the implementation of this plan, i.e. those species of plants and animals, and their habitats, that the LPO NWR supports. It is also Service policy to protect cultural and historic sites, threatened and endangered species, critical habitats, Refuge facilities and private property that may be threatened by a fire on refuge lands

Resources which will be protected include the remnant stands of old growth ponderosa pine, site containing a rare plant species known as Adder's Tongue, structures of cultural significance, campgrounds, and whitetail deer habitat

Historic sites include the Refuge office, Winslow Cabin, and the Christiansen Homestead

Adjacent property under other ownership will be protected from fires which occur on the Refuge in accordance with Service policy

Current Objectives of the Refuge Comprehensive Conservation Plan

The objectives and goals of the Refuge may be reviewed in detail in the CCP. The thrust of management, as it relates to fire, will be to strive for native diversity of existing forest habitats and to enhance those elements which have been degraded or lost through past activities such as fire suppression and the removal of the mature and old growth forests through land clearing and timber harvest.

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Other Pertinent Management Plans

1. The Habitat Management Plan, which is under development, will also include a large measure of prescribed fire in keeping with the philosophy of enhancing native diversity and utilizing fire in a simulated natural role to maintain overall forest health and reduce the incidence of severe wildfire.

2. The Wildlife Management Plan, also under development, is expected to utilize fire to achieve objectives related to deer winter range and other species of interest.

3. Fish and Wildlife Inventory and Monitoring Plan

4. Road Management Plan

The Fire Management Plan will help meet the objectives detailed in other planning documents through the use of fire as a tool to maintain the desired mix and proportion of habitats for a variety of wildlife species as described in the CCP. For example, prescribed fire will be used to help restore and maintain much of the Refuge's 8,000 acres of ponderosa pine habitat which is of great importance to a wide array of plant and animal species.

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Current Fire Management Organization

Fire Management Officer (FMO)
GS-11/.5 FTE/(13 PP)PFT

Prescribed Fire Specialist (RXB1 or 2, or other)
GS-9/1 FTE (26 PP)PFT

Lead Engine Boss (ENGB)
GS-7/.7 FTE (1 Person) 22 PP
Career Seasonal

Engine Boss (ENGB)
GS-6/.5 FTE
1 Person; 13 PP/Seasonal

Firefighter (FFT)/2 GS-4
1.0 FTE
2 Persons; 13 PP
Seasonal

The current organization calls for 3.9 Full-Time Equivalents (FTE); 1.7 allotted through fire suppression base funding plus 2.2 to be paid for out of 9263 to accomplish prescribed fire goals. The FMO allots 2 PFT positions at 26 Pay Periods (PP) each and 3 seasonal positions at 10 PP each for a total FTE complement of 4.0 for suppression only.

At this level the Refuge can accomplish approximately 80% of our burning with available personnel. From a practical standpoint this is essential since "burning windows" are not very predictable and tend to be of short duration here. This staffing level will also allow us to be more cost effective on a per acre basis since the additional costs of bringing in extra personnel will be avoided except in a few circumstances.

All requirements of 6 RM 7.15 and the Fish and Wildlife Service Policy Manual Part 621 Fire Management will be adhered to for the training and qualifications of Refuge personnel.

The Service has adopted the National Wildfire Coordinating Group (NWCG) Interagency Wildland Fire Qualifications Guide 310-1 to identify minimum national standards for training, experience, and physical fitness for positions under the Incident Command System (ICS).

Basic requirements for all employees involved in fire activities will be S-130, S-190, and Standards for Survival.

Additional training will be scheduled on a case by case basis for all personnel involved in fire activities. Individual training plans will be developed according to position, current qualifications, and anticipated future needs.

Position Responsibilities:

FMO: Oversees entire Fire Management Program including planning, budget, personnel, training, policy implementation, qualifications, preparedness, equipment purchase and maintenance, suppression, prescribed fire, prevention, safety, and coordination with other agencies.

Prescribed Fire Specialist: Primary responsibility is to plan and carry out all aspects of prescribed burning operations with oversight and consultation provided by the FMO. Incumbent will also be closely involved with various aspects of fire suppression operations.

Engine Boss (Lead): Duties include overseeing daily operations of fire crew personnel including preparation of burning units, maintenance of equipment, physical fitness training, crew training and currency, preparedness of crew, engines and other fire apparatus, fire prevention, prescribed burning operations, and suppression.

Engine Boss: Oversees engine and crew assigned to him/her. Participates in all prescribed fire and suppression operations.

Firefighter: Serves as a member of an engine crew. Participates in all prescribed fire and suppression operations.

For other key contacts and related fire personnel see Appendix A, Little Pend Oreille NWR Fire Dispatch Plan (not attached to this CCP/EIS).

II. Description of Refuge

General (reference the Refuge Comprehensive Conservation Plan for additional details)

The Little Pend Oreille NWR is located in the mountainous northeastern portion of Washington State with an elevation range of 1800 feet on the west side to greater than 5600 feet on the east boundary. The Refuge is predominantly located in Stevens County with a small portion of its eastern boundary in Pend Oreille County.

In addition to elevation, other principle climatic influences occur from weather systems which originate over the North Pacific and continental air masses from the Inland Basin to the south and the Canadian heartland to the north. Due to the prevailing westerly winds, the systems from the North Pacific dominate the weather during most of the year which helps to moderate temperatures year round. However, occasional blasts from the Canadian Arctic spill over the Northern Rockies from the northeast and govern our weather for extended durations. When these arctic air masses occur it results in an increase in cloudiness, precipitation, and during the warmer months, an increase in lightning activity greater then that of most areas east of the Cascades. During the winter months temperatures can be sub-freezing for prolonged periods.

The area generally receives between 38 to 64 cm (15 to 25 inches) of precipitation per year in the valleys with up to 40 inches and greater at higher altitudes. Most of this moisture is received from mid September through mid January. The driest period is late June through early September.

Low elevation summer temperatures range from the upper 40's to the middle 80's with an expected decrease of about 3 degrees F. for each 1000 feet of increase in elevation. Maximum temperatures exceed 95 degrees 5 to 20 days each summer and 100 degrees on 1 to 5 days. Average winter temperatures range from 10 degrees to slightly above freezing with extremes going down to -30 and -40 degrees F. The daily temperature range in the summer is about 30 degrees and about half that in the winter.

The average daily variation in relative humidity during the winter is from 88% at night to 78% in the afternoon; 80% to 45% in the spring and fall, and 65% to 25% in the summer.

Much of the adjacent land surrounding the Refuge on the northern and western boundaries is in state and private ownership while the lands to the south and east are dominated by lands managed by the USDA Colville National Forest and private timber companies.

Social, political, and economic resources center around the town of Colville which serves as the Stevens County seat of government. Most livelihoods in this area are supported by service and light industry, state and federal jobs, cattle ranching, wheat farms and the timber industry.

In the early part of this century, the immediate area of the Refuge surrounding the lower and middle portions of the Little Pend Oreille River was occupied by homesteaders and lumber camps. Decades of farming, grazing, mining, and logging reduced the quality of the habitat to such a degree that the Little Pend Oreille white-tail deer herd was believed to be in jeopardy. As farms and ranches went "bust" and the best accessible timber was decimated, private ownership of the land was abandoned. Land reverted to Federal ownership through a variety of Acts and Statutes with the end result being the issuance of Executive Order No. 8104 signed by President Franklin D. Roosevelt on May 1, 1939, which established the Little Pend Oreille Wildlife Refuge. On July 27, 1940, this became the Little Pend Oreille National Wildlife Refuge by Proclamation No. 2416.

Today, the Refuge comprises 40,198 acres most of which is timbered and typical of the surrounding forests.

Early management consisted of various projects designed to enhance the deer population, fishing opportunities, and waterfowl habitat.

In 1965, management of the Refuge, through cooperative agreement, was granted to the Washington State Department of Fish and Wildlife. Primary management focused on the white-tailed deer herd and their winter range but some activities also centered on forest grouse habitat and the fishing opportunities afforded by the areas lakes and streams.

Aquatic

The Refuge maintains a highly valued wetland component made up of rivers, streams, and lakes. The centerpiece is the Little Pend Oreille River itself which flows diagonally across the Refuge from the northeast to the southwest for some 13 miles. Except for some private in holdings, the Refuge encompasses the entire Bear Creek watershed which is a major tributary of the Little Pend Oreille River. With today's emphasis on ecosystem management, the significance of this is obvious both from a management standpoint, as well as an environmental one. Six other smaller, but no less significant watersheds, ultimately end up in the LPO river and have either their origins on the Refuge, or a large portion of their courses flow through the Refuge. From the southwest to northeast, these watersheds are Norman, Narcisse, Squaw, Cedar, Scrabblers and Olsen Creeks. Two streams, which have their headwaters located on the Refuge, but drain into the Colville River are Slide Creek and Moran Creek on the extreme southwest corner of the Refuge. Many other seasonal streams and high quality springs can be found on the Refuge.

Several small lakes are dispersed through the Refuge with the most important being McDowell and Bayley Lakes. Each of these lakes spill out into a chain of beaver ponds which provide notable habitat for waterfowl and the occasional moose which pass through the area. Indications point to a rapidly expanding moose population and continued dispersion in this part of Washington. Potter's Pond and Bayley and McDowell Lakes provide recreational fishing

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opportunities as well. Bayley Lake in particular, is very productive and is connected to Potter's Pond by an outfall channel which has become a spawning stream for the lake's trout.

Riparian Woodlands

Interspersed throughout the Refuge are well developed stands of hardwoods with affinities for moist sites. These woodlands include quaking aspen (*Populus tremuloides*), mountain alder (*Alnus tenuifolia*), Sitka alder (*Alnus sinuata*), willow (*Salix* spp.), black cottonwood (*Populus trichocarpa*), Douglas maple (*Acer glabrum douglasii*), white birch (*Betula papyrifera*) and water birch (*Betula* spp.).

Hardwood stands are attractive to a variety wildlife for their nutritious forage, thick cover, source of water, and general diversity of plant species. This attraction was similarly felt by the early settlers and as a result most of these hardwood forests have been altered to various degrees through clearing for home sites, farming, and pastureland.

In addition to their importance to wildlife, hardwoods play a major role in streambank stabilization and soil retention in floodplains. While dependant upon a wide array of environmental factors, the sequence of re-colonization of streambanks often begins with alders pioneering sand and gravel bars, followed by cottonwood and aspen.

These wet woodlands are only susceptible to fire in the very driest of years and when they do burn it tends to produce conditions favorable to the reproduction of these pioneering species. In fact, with aspen in particular, fire creates conditions necessary for reproductive growth from rootstock (see this appendix's section on Fire Ecology, Fire Effects on Forest Communities).

Upland Forests

Old photographs, survey notes, and existing remnant stands indicate that much of the Refuge was characterized by extensive stands of large, old growth ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudosuga menziesii*) and western larch (*Larix laricina*) prior to settlement and exploitation. Impressive stands of western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*) and other mixed conifer stands were also present. Records indicate that logging has occurred on the Refuge since its inception with a primary objective of improving wildlife habitat, but also for forest sanitation and salvage. Letters in the Refuge files indicate that the cedar poles cut on the Refuge were so desirable that they were specifically requested by buyers from the mid west. Taken as a whole, the mixed-conifer forests which dominate the Refuge are the most complex in the Pacific Northwest (Agee, p.280, 1993).

Currently, most of the forest land is in second and third growth mixed stands with a tendency toward a higher numbers of stems per acre and a greater percentage of shade tolerant species than naturally occurred here. This can be directly attributed to past timber harvest practices and aggressive fire suppression. The southeastern corner of the Refuge contains an extensive roadless area with an old growth timber component. This area comprises about 3200 acres and was once proposed as a designated Wilderness Area. Two Research Natural Areas (RNA) are located on the Refuge: the Varline Grove-Flodelle RNA and the Baird Basin RNA. These areas exemplify a collection of relatively undisturbed Society of American Foresters (SAF) Forest Cover Types typical of Northeastern Washington (see details under this appendix's Wilderness and Special Areas section).

The Refuge is well represented by a variety of forest types from low elevation ponderosa pine on its western edge which gradually becomes higher elevation mixed stands of Douglas-fir, grand fir, lodgepole, western white pine, western larch, western redcedar, western hemlock, Englemann spruce (*Picea engelmannii*) and sub-alpine fir (*Abies lasiocarpa*) as one progresses from the west to east. Also present, are hardwood species as described above in the Riparian Woodlands Section. For management purposes, these various forest types have been grouped into three broad classifications: Dry Forest; Moist Forest; and Cold Forest groups. For further explanation see the CCP/EIS. Each of these broad forest categories, in turn, represent fire regimes which may be based on a variety of factors, but present purposes, will be founded upon fire return intervals and vegetation communities.

The fire regimes have tremendous ecological importance to the Refuge, especially in light of the fact that key local species such as, ponderosa pine, western larch and Douglas-fir, and their associated vegetative complexes, are highly adapted to wildfire. The continuity of fire disturbance, and by extension, the fire regimes, has been interrupted in Refuge forests through nearly a century of fire suppression. (See additional fire ecology in following section under Fire Management)

Fire suppression has been so successful and logging clearing operations so pervasive throughout our forests that major transformations are taking place which are being recognized as less then desirable. The two most serious problems encumbering forest habitat management are excessively high fuel loadings and conversion of forests from highly fire resistant and fire dependant species to shade tolerant, fire sensitive species. Dealing with these two problems predicates the essential elements of forest habitat management on the Refuge.

Prior to pioneer settlement, the low elevation ponderosa pine habitat was burned by wildfire every 5 to 25 years. This relatively high frequency, low intensity fire is essential to maintaining healthy stands of interior ponderosa pine.

Perhaps more then any other single event, wildfire has shaped and profiled the character of our forests. Human caused and lightning caused fires burned through virtually the entire Refuge with varying degrees of frequency. This repeated disturbance led to the ecological adaptation of various forest communities to degrees of tolerance to fire frequencies and intensities. Low elevation dry sites with greater fire frequencies favored those species which developed deep tap roots, thick exfoliating and insulating bark, and good self pruning traits especially as the trees matured. This ensured that the larger, older specimens could survive progressively greater fire

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intensities due to their high fire resistance and wide spacing and thus, continue to provide seed for many years.

Mixed stands of Douglas-fir and other species burned at somewhat greater intervals depending upon topography, aspect, elevation, and fuel type. Most of the Refuge forest is dominated by Douglas-fir mixed forest in both dry and moist settings. The natural periodicity of fire in the dry Douglas-fir is between 10 and 24 years (Agee p. 293, 1993) while the moist forest is somewhat longer at 13 to 26 years

Western red-cedar western hemlock draws and high elevation sub-alpine fir types have the longest fire intervals. Fire may only visit these stands every 50-100 years with low to moderate intensity fires and every 150 -500 years with stand replacement fires (Forested Plant Associations of the Colville National Forest, p. 194, 1995).

Old Fields; Homestead Pastures and Agricultural Fields

There are approximately 58 man-made openings within the Refuge, totaling 631 acres. The largest contiguous openings are a legacy from the homesteading days when areas were cleared for farming and grazing operations. Since grazing has remained a part of the Refuge operation, these openings still exist, although in some areas they are being reclaimed by the forests which once occupied them.

In terms of fire management, these old fields are dominated by grass fuels which are quite flashy during the height of fire season and can be readily burned during the fall or late winter/early spring prescribed fire season. Although these fields are not naturally occurring, they do add to habitat diversity and the Comprehensive Conservation Plan calls for maintaining some of them through the use of fire.

Natural Openings and Meadows

Somewhat rare in terms of total acres, 96.5, natural openings can be found throughout the Refuge on the dryer ridge tops in particular, but also in a few moist bottomland meadows. The majority of natural open meadows are found on the lower elevation slopes and ridges on the west side of the Refuge

Other Habitats; Cliffs, Talus Slopes

Cliff Ridge and portions of the west slope of McDonald Mountain represent the Refuge's most dramatic forms of this habitat. Other remote cliff and talus sites occur on Scrabbler's Peak and Blacktail Mountain. These habitats are important as natural fire breaks, safety zones, and potential hazard areas

Wilderness and Special Areas

Refuge records indicate that as early as March of 1948, expanses of the LPO were being examined for inclusion into a national inventory of protected lands, termed "Natural Areas", representing typical climax forests of the major types as defined by the Society of American Foresters (SAF) and proposed in February of 1947. Today, these are known as Research Natural Areas or RNA's.

The original RNA for the LPO was what the Refuge now calls Baird Basin, a 160 acre tract in the North Fork of the Bear Creek watershed. This parcel typifies SAF Forest Type 212, Larch-Douglas-fir. In 1959, this was refined to indicate that two additional SAF Forest Cover Types were also present. They are;

SAF Type 214, Ponderosa pine-larch-Douglas-fir

SAF Type 218, Lodgepole pine

During this period, two other RNA's were proposed. The Varline Grove-Flodelle Creek area and the Edmonson Grove. The Edmonson Grove was rejected as being too small (8 acres), but remains a very impressive Type 214 dominated by old growth ponderosa pine in a largely pure stand.

Varline Grove-Flodelle Creek, also 160 acres, was accepted, and represents;

SAF Type 206, Englemann spruce-subalpine fir

SAF Type 212, Larch-Douglas-fir

SAF Type 218, Lodgepole pine

The Wilderness Act of 1964 stimulated a great deal of interest in the possibility of designating a portion of the Refuge under this initiative. In the early 1970s, a study was undertaken to determine the suitability for the Refuge as wilderness. After lengthy research, public hearings, letter campaigns, and much discussion, it was determined that the Refuge did not fit the designation and was rejected in 1974. It was rejected because the State issued permits for haying, grazing, timber sales, and other uses. Also, there were plans to cut trees in the roadless areas. Subsequent cutting and road building did take place in portions of the 1974 roadless area. Despite this lack of technical classification, there remains a 5,520 acre block of unroaded and largely undisturbed forest in the southeastern corner of the Refuge. This area requires special consideration in future step-down management plans.

Geology and Soils

Little Pend Oreille National Wildlife Refuge is located in the eastern portion of the geographic region known as the Okanogan Highlands Province which stretches from the Methow River Valley in the west to the western Slope of the Northern Rocky Mountains in the east, and the Columbia River Breaks in the south, to the upper reaches of the Kettle River in British Columbia, Canada.

The land is characterized by wide, flat north south river valleys surrounded by mountainous terrain distinguished by moderate slopes and broad rounded summits. The current configuration of this region was formed during the Pleistocene Epoch when the entire province was repeated covered and uncovered by glacial ice. Deposits of glacial drift are common. This is especially true of the land forms north of Spokane where the Refuge is located. Underlying these glacial masses in the eastern parts of the province are primarily quartzite, graywacke, slate, argillite, phyllite, greenstone, and some limestone as deposited during the Paleozoic Era.

In this province, the general classes of soils are closely related to the elevations at which they occur. Granitic soils are common away from the river valleys in the mountains and generally fall into Xerocherpts (Regosols) and Cryorthods (Podzols). Xerocherpts have very little profile development and are most often cold, acid, stony or gravelly loams of about 3.5 feet in depth. Cryorthods contain higher contents of silt and loam and greater profile development containing both A2 and B2 horizons with high iron contents.

The lower river valleys reflect drier conditions and transition from forest to grassland communities. Glacial till and Haploxerolls (Chernozem soils) dominate. Soil texture is typically sandy loam and loam with more definition in the structure containing both A and B horizons. (From Natural Vegetation of Oregon and Washington 1973)

III. Fire History, Ecology and Effects

Fire history of the Refuge is spotty in the historical record but there is some information and accounts from old newspapers and Forest Service maps. In large part, natural fire was suspended from running its normal course in the 1920's when the lower elevation dry forest areas of the Refuge were being cleared and settled. Prior to homesteading, there is little specific information concerning the Refuge environment. Information can be gleaned from original survey notes and journals from early explorers such as the Thompson Expedition.

It is evident that the area was covered with an extensive wilderness of virgin forest rich in wildlife. The age and extent of the forests are apparent today as indicated by photographs, remnant stands of timber and the very large stumps found throughout the Refuge in areas which were homesteaded and logged. Fire scars on old trees in Research Natural Areas (RNA's) such as Baird Basin and remnant old growth stands indicate that the LPO NWR is no stranger to fire. Old photographs show that much of this part of the State was open forest land dominated by

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large ponderosa pine trees and maintained in that condition by periodic low intensity fires. Prior to 1965, fires were responded to by the Refuge staff and whatever help they could muster from other agencies and adjacent landowners. From 1965 until 1994, the fire suppression duties at this station fell to the Washington State DNR. In 1994, the Service resumed all responsibilities.

Recorded fire history for this area of Washington begins in the latter half of the 1800's as more and more homesteaders began establishing farms and clearing forest land for pasture and crops. Subsequent to logging and clearing, burning was employed as a common and effective method for eliminating logging slash; indeed, for many homesteaders, it was their only viable option. Because wildland fire suppression was not a common practice until well into the 1900's , many of these human caused fires burned off the intended land and into the surrounding forests where they were left to run their course. This probably occurred without much damage since natural fire was still a common phenomenon during this period and the adverse effects of decades of fire suppression had not yet been recognized.

The following chronology presents some of the larger fires occurring in this area dating back to the 1910's.

1994: Olsen Peak; Eastern Boundary of the Refuge; 5600 feet; 185 acres
1994: Copper Butte; northwest of Refuge; 7000 acres
1985: Narcisse Fire; north boundary; 700 acres
1988: White Mountain; west of Refuge; 20,000 + acres
1988: Grass Mountain; north of Refuge; 2000 acres
1930's: Series of extensive and frequent fires throughout the area; precise data unavailable
1927: Lakes Fire (Coffin Lake; from old USFS map)
1926: Squaw Creek Fire (from old USFS map)
1924: GLO Report describes large area around Black Lake burned
1920's: Series of extensive and frequent fires throughout the area; precise data unavailable
1910's.
1908: Fire burned 20 sections from the Lenhart Meadows area to the Blacktail Mountain and Scrabblers Mountain areas
1907: GLO Report describes large fire in the Black Lake Area
1898-1907: Numerous fires believed to be ignited by homsteader's to clear land
1897. Government surveyors indicated that all or parts of, 10 sections in the Baird Basin Area were burned over just prior to their arrival to perform surveys

Fire Ecology/Fire Effects on Forest Communities

The ecological role of fire is as complex as the local habitat is diverse. Throughout their ranges, ponderosa pine (*Pinus ponderosa*), western larch (*Larix laricina*) and, to a somewhat lesser degree, Douglas-fir (*Psuedosuga menziesii*) are well adapted to wildfire. These three species dominate our forest habitat and exhibit evidence of regular disturbance by wildfire.

Prior to pioneer settlement, the low elevation ponderosa pine habitat was burned by wildfire every 5 to 25 years. This relatively high frequency, low intensity fire is essential to maintaining healthy stands of interior ponderosa pine. For this reason, most of the initial prescribed fire management activity referred to in the CCP and this management plan will be carried out in the ponderosa pine forests.

Ponderosa pine produces an abundance of highly resinous needles which provide excellent fuel for carrying fires that the species depends upon to help sanitize the stand, prepare sites for seed germination, and reduce competition. Other adaptations include self pruning of lower branches, long needles in an open type crown, high foliar moisture content, large buds with insulating scales, thick, exfoliating bark, and deep taproots. All of these help individual trees survive fire and make the ponderosa pine forest dependent upon fire for overall stand health and vitality.

In addition, the Refuge's dry forest community has a large area of dry site Douglas-fir grand fir. This forest type has many of the same characteristics as the ponderosa pine community albeit to a lesser degree. These forests also require periodic fire to maintain vigor.

Use of fire and other management strategies will result in reduced stocking, increases in average stand diameters, and greater overall vigor in the tree, shrub, grass, and forb components, all of which are important to wildlife. Restoring the periodic occurrence of fire will also promote deciduous tree species such as aspen (*Populus tremuloides*), black cottonwood (*Populus trichocarpa*), western white birch (*Betula papyrifera*) and water birch (*Betula occidentalis*). These species occurred in far greater abundance under a natural fire regime where fires burned at regular intervals.

Of particular note is the gradual loss of aspen clones throughout the dry forest. Aspen is an important species for a wide variety of migratory and resident birds and also for big game such as deer. Aspen occurred on wetter microsites within the larger forest and greatly added to native habitat diversity. Fire suppression and grazing has led to a downward trend for these desirable stands. Under a normal fire regime, fire would curtail encroachment by ponderosa pine and other species because, during most instances when the surrounding forest would burn, aspen groves would be too wet to carry a fire. In those seasons when aspen stands would burn, the fire tended to be light and aided in aspen regeneration by exposing more soil to sunlight and warmth. With the exclusion of fire, invasion of other tree species into and around the aspen groves has resulted in excess competition for resources, in particular, water and light. Aspen is relatively short lived tree compared to ponderosa pine, western larch, and Douglas-fir, and propagates best through cloning by means of root suckers produced on lateral root buds. This suckering is viable and sustainable when an abundance of light and heat reach the forest floor. As the larger aspen trees in a grove die out, they would normally be replaced by developing clones from below. Excessive competition from invader tree species slowly negated this process. As a result, aspen stands lose vitality and began to fade. Many remnants of these groves can still be found but they are very much in decline and require attention if they are to be revived and allowed to flourish.

As mentioned above, prior to pioneer settlement, the low elevation ponderosa pine habitat was burned by wildfire about every 5 to 25 years. Mixed stands of Douglas-fir and other species burned at somewhat greater intervals depending upon topography, aspect, elevation, and fuel type. Most of the Refuge forest is dominated by Douglas-fir mixed forest in both dry and moist settings. The natural periodicity of fire in the dry Douglas-fir is between 10 and 24 years (Agee p.292-293, 1993) while the moist forest is somewhat longer at 13 to 26 years.

High elevation sub-alpine fir forests have the longest fire intervals of the forest types on the Refuge at 109-275 years (Agee, p.254, 1993) depending upon the actual location. Due to the low resistance to fire of the tree species associated with the "cold forest" zone and the marginal environment in which these trees exist, regeneration and growth after disturbance can be a long and difficult process which may last for decades or centuries. The relative permanence of sub-alpine meadows is largely due to this phenomenon (Agee, p.253). On the LPO, western hemlock and western red-cedar trees are usually found growing in the same area. For this reason, these species will be considered together for this Fire Management Plan.

Western hemlock western red-cedar stands are common on the Refuge and are rated as low to moderate in their resistance to fire. These stands typically persist for long periods of time, on the order of several centuries. Data from North Idaho indicates that fire return intervals of 50-100 years for low to moderate intensity fires and 150 -500 years for stand replacement fires (Forested Plant Associations of the Colville National Forest. 1995). This is likely due to the stands' propensity to grow on cooler, wetter sites then their competitors and the fact that they so dominate a site that very little can exist beneath their closed canopy except for their own offspring and ground covering plants such as queencup beadlilly (*Clintonia uniflora*) and twinflower (*Linnaea borealis*). This combination of wet, cool site and paucity of understory fuel does not lend itself to frequent or intense fires. The fact that western hemlock western redcedar stands tend to achieve their full climax potential in stream bottoms often allows them to serve as effective natural fire breaks during normal fire seasons when the surrounding uplands have favorable conditions for supporting fire. Furthermore, large, old cedar trees with thick insulating bark are more resistant to damage from fire than younger, thin barked trees. Old cedar stands with clear understories tend to have very light, low intensity fires which helps contribute to stand longevity.

The moist and cold forest zones will also benefit from occasional prescribed fire. Because the natural fire regime indicates that the natural fire return interval was greater in these types, the effects of fire exclusion have been far less dramatic. Fire will not be used to the same extent as in the dry forest zone. Fire's application will be guided by the concept of restoring overall forest health and vigor in those areas where its use is determined to be beneficial and necessary.

IV. Wildland Fire Management

In 1994, a position of Fire Ecologist ROS was established at LPO to administer the overall fire management program for the station. An agreement was entered into between the U.S. Forest Service (USFS) and the U.S. Fish and Wildlife Service (USFWS) for fire suppression and initial attack support to be provided by personnel from the Colville National Forest which borders the Refuge on the eastern and southern boundaries. It proved to be an equitable arrangement during 1994's heavy fire load here in Washington state. Good coordination existed between the Refuge staff and USFS personnel and there was reliable and adequate response to the fires which occurred on the Refuge.

The current agreement, termed a **Local Annual Operating Plan**, is predicated upon the interagency **Master Cooperative Fire Protection Agreement** (see Fire Management Plan Appendix C (not attached to this CCP EIS)). This new agreement is a direct result of new funding authority (9263 funding) from Congress and an enhanced spirit of cooperation in fire management. Since this is the first year of these new authorities, some modifications may occur.

The Little Pend Oreille NWR has been input into the FIREPRO system and initial computer analysis performed in 1994 indicated a need for two permanent and three seasonal positions based solely on the wildfire history and the Refuge profile.

The advent of special funding (9263) to accommodate increased expenditures directed toward prescribed burning has provided the flexibility to increase Refuge staffing to accommodate this directive.

INTERAGENCY CONTACTS

Agency	Phone Number
Colville National Forest Dispatch	509-684-8384
Washington Department of Natural Resources	509-684-7474
Spokane Bureau of Indian Affairs	509-258-4566
Central Washington Interagency Communication Center	509-662-4393
Northwest Interagency Communication Center	503-326-7405
Boise Interagency Fire Center Roger Erb	208-387-5595
Portland Regional Office Dennis Macomber	503-231-6171

PREVENTION PROGRAM

The fire prevention program on the Refuge is geared toward increasing public awareness of wildland fire prevention by providing information, instruction, and reminders of its importance. The best way to reach the Refuge visitors is through the use of a sign program.

The intent of the sign plan is to give an overview of the fire prevention signs used on the Refuge and direction of when they need to be in place. Signing is one of the most valuable means of informing the public of fire danger by reminding them of regulations and restrictions.

The Little Pend Oreille signs fall into three general categories: 1) Industrial Fire Precaution Level signs, 2) Fire Prevention (Refuge entry road) signs and 3) Campground Signs. Each type will be addressed in an individual manner.

1. Industrial Fire Precaution Level signs are to notify industrial users of the Refuge changes in the Industrial Fire Precaution Level (IFPL) and fire danger. This has ramifications on Refuge use, especially to woodcutters, loggers, and other industrial users. IFPL's and fire danger adjectives are generated by fire danger conditions. The Refuge will be notified by the Colville National Forest Dispatch Office when there is a change in the IFPL. The IFPL signs must be updated the same date as notification is given.

2. Fire Prevention (Refuge entry) signs are located on the main roads entering the Refuge. These signs are designed to be visible to the casual observer without detracting from the beauty of the Refuge. Poster signs are stapled to the front and back with messages on them as appropriate to the season of fire danger. These messages rotate as the fire danger and weather conditions dictate.

3. Campgrounds are also signed with messages appropriate to the season of fire danger.

The responsibility for maintaining and rotating messages on the prevention signs will be the engine captain's. The engine captain will use the engine crews to post, repair, and maintain signs. The prevention signs will be stored in the fire cache. Each engine will carry a couple of signs in order to replace ones found damaged or missing.

Industrial Fire Precaution Level Sign Plan

The industrial fire precaution level signs are changed when a change in precaution level is announced by the Colville National Forest Dispatch office. This is announced during the daily fire weather forecast. The IFPL will change at midnight the day the change is announced. Signs must be changed the day a change is announced. The IFPL directly affects industrial activities on the Refuge. Leaving the signs overnight or posting IFPL signs incorrectly is unacceptable. When a change of the IFPL is announced, the engine crews are to be notified to be sure they heard the change. Signs must be changed either immediately or at least the same day. The

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Refuge manager, fire management officer, and timber sale administrator should be notified immediately or as soon as possible. Extra emphasis should be placed on the Refuge manager and fire management officer. They should be called at home and notified if they are not in the office or they are unreachable by radio. Use the IFPL Notification Checklist (Appendix A) to make sure necessary notifications have been made. These check lists are in the fire management office.

Fourth of July/Independence Day Sign Plan

Fireworks on the Little Pend Oreille NWR are specifically cited in 36CFR 261.52(f) prohibiting; "Possessing, discharging or using any kind of fireworks or other pyrotechnic device." "No Fireworks" signs must be posted which specifically prohibit the use of fireworks on the Refuge. Fireworks go on sale June 23 through July 6. The signs must be posted at least by June 23.

Along with the Refuge entry signs, campground signing is especially important as this is where most of the fireworks would be used by the public. A sign is to be kept on the campground billboard. Signs are to be checked occasionally to ensure that they haven't been taken down or rendered unreadable by vandals.

Extreme Fire Danger Sign Plan

When the Refuge goes to an IFPL of III or higher, Extreme Fire Danger Signs should be put up to warn Refuge visitors to be extra careful. This will not necessarily predicate a campfire closure.

Campfire Closure Sign Plan

When the danger of forest fire dictates, a campfire closure might be issued by the Refuge manager. As a rule, this closure will mean no campfires except in designated areas. These areas will be identified by the Refuge manager. Campfire closures may require signing at the dispersed sites as people often use these sites in lieu of the designed campgrounds and might not be aware of the closure if not for dispersed site signs.

Refuge Closure Sign Plan

Refuge closure would be announced by the Refuge manager. The responsibility of fire management includes signing, patrolling, and enforcement. Roads closures will be planned and listed by the Refuge manager. The signs to use are "Closed Due To Fire Hazard". These will be placed at all the entrances to the Refuge.

Preparedness and Suppression Overview

The Refuge wildfire season typically begins about the middle of June and goes through September with a peak period from late July until the first week of September when accumulated fuels and weather conditions combine to create the most volatile fire situations and extremes of fire behavior. This pattern holds true for all Fire Management Units (FMU's; see below), with the dry forest becoming volatile earliest and staying vulnerable to fire the longest. The cold forest is susceptible to fire for the shortest period.

For the purpose of estimating fire behavior, natural wildland fuels are described as "Fuel Models" (FM). Fuel Models are further broken down into four broad categories progressing from lightest to heaviest as follows; Grass, Brush, Timber, and Logging Slash. Each FM is characterized by fuel size classes expressed in inches in diameter, tons per acre, live verses dead and fuel bed depth. These are all measurable descriptors which enter into the fire behavior prediction equations. For complete details and characteristics of the currently applied 13 Fuel Models, refer to Hal E. Anderson's Aids to Determining Fuel Models For Estimating Fire Behavior, GTR INT-122.

Ranges for Fuel Models 3, 9 and 11 are shown below. These are presented in order of complexity and difficulty of control using input data collected on site for an average high severity day in August 1998.

```
DIRECT
 1--FUEL MODEL -------------    3 -- TALL GRASS, 2.5 FT (75 CM)
 2--1-HR FUEL MOISTURE, % --   2.0
 7--MIDFLAME WINDSPEED, MI/H   2.0   4.0   6.0   8.0  10.0
 8--TERRAIN SLOPE, % -------  15.0
 9--DIRECTION OF WIND VECTOR     .0
    DEGREES CLOCKWISE
     FROM UPHILL
10--DIRECTION OF SPREAD ----     .0  (DIRECTION OF MAX SPREAD)
   CALCULATIONS
    DEGREES CLOCKWISE
     FROM UPHILL
```

```
MIDFLAME I RATE OF  HEAT PER   FIRELINE   FLAME   REACTION      EFFECT.
 WIND    I SPREAD   UNIT AREA  INTENSITY  LENGTH  INTENSITY     WIND
         I
 (MI/H)  I  CH/H)   (BTU/SQFT) (BTU/FT/S) (FT)    (BTU/SQFT/M)  (MI/H)
         I
  2.0    I   65.      980.       1165.     11.6      3828.        2.2
         I
  4.0    I  142.      980.       2557.     16.6      3828.        4.1
         I
  6.0    I  233       980.       4194.     20.9      3828.        6.1
         I
  8.0    I  335.      980.       6013.     24.6      3828.        8.1
         I
 10.0    I  444.      980.       7980.     28.1      3828.       10.1


MIDFLAME I   AREA   PERIMETER  LENGTH-    FORWARD   BACKING   MAXIMUM
 WIND    I                     TO-WIDTH   SPREAD    SPREAD    WIDTH
         I                     RATIO      DISTANCE  DISTANCE  OF FIRE
  (MI/H) I  (AC)     (CH)      (CH)       (CH)      (CH)
         I
   2.0   I  1107.    386.       1.5       129.7     17.6       95.7
         I
   4.0   I  3581.    734.       2.0       284.7     19.7      149.8
         I
   6.0   I  7360.   1118.       2.5       466.9     19.8      192.5
         I
   8.0   I 12311.   1532.       3.0       669.4     19.3      227.6
         I
  10.0   I 18332.   1974.       3.5       888.3     18.6      257.3


DIRECT
 1--FUEL MODEL -------------     9 -- HARDWOOD LITTER
 2--1-HR FUEL MOISTURE, % --     2.0
 3--10-HR FUEL MOISTURE, % -     3.0
 4--100-HR FUEL MOISTURE, %      4.0
 7--MIDFLAME WINDSPEED, MI/H     2.0  4.0  6.0  8.0  10.0
 8--TERRAIN SLOPE, % -------     15.0
 9--DIRECTION OF WIND VECTOR      .0
     DEGREES CLOCKWISE
      FROM UPHILL
10--DIRECTION OF SPREAD ----      .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
     DEGREES CLOCKWISE
      FROM UPHILL
```

```
MIDFLAME I RATE OF   HEAT PER    FIRELINE   FLAME   REACTION      EFFECT.
  WIND   I SPREAD   UNIT AREA   INTENSITY  LENGTH  INTENSITY      WIND
         I
 (MI/H)  I (CH/H)  (BTU/SQFT)  (BTU/FT/S)   (FT)  (BTU/SQFT/M)  (MI/H)
         I
   2.0   I   4.       488.        38.        2.4     3157.        2.2
         I
   4.0   I  10.       488.        90.        3.6     3157.        4.1
         I
   6.0   I  18.       488.       164.        4.7     3157.        6.1
         I
   8.0   I  29.       488.       260.        5.8     3157.        8.1
         I
  10.0   I  42.       488.       374.        6.9     3157.       10.1
```

```
MIDFLAME I  AREA  PERIMETER  LENGTH-    FORWARD    BACKING    MAXIMUM
  WIND   I                   TO-WIDTH   SPREAD     SPREAD     WIDTH
         I                   RATIO      DISTANCE   DISTANCE   OF FIRE
 (MI/H)  I  (AC)   (CH)      (CH)       (CH)       (CH)       (CH)
         I
   2.0   I   4.7    25.       1.6        8.5        1.1        6.2
         I
   4.0   I  17.8    52.       2.0       20.0        1.4       10.5
         I
   6.0   I  45.7    88.       2.5       36.8        1.6       15.2
         I
   8.0   I  92.9   133.       3.0       58.1        1.7       19.8
         I
  10.0   I 162.8   186.       3.5       83.6        1.8       24.3
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DIRECT
  1--FUEL MODEL -------------   11 -- LIGHT LOGGING SLASH
  2--1-HR FUEL MOISTURE, % --    2.0
  3--10-HR FUEL MOISTURE, % -    3.0
  4--100-HR FUEL MOISTURE, %     4.0
  7--MIDFLAME WINDSPEED, MI/H    2.0  4.0  6.0  8.0  10.0
  8--TERRAIN SLOPE, % -------   70.0
  9--DIRECTION OF WIND VECTOR     .0
     DEGREES CLOCKWISE
      FROM UPHILL
 10--DIRECTION OF SPREAD ----     .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
     DEGREES CLOCKWISE
      FROM UPHILL
```

MIDFLAME WIND (MI/H)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQFT/M)	EFFECT. WIND (MI/H)
2.0	11.	978.	201.	5.2	3011.	6.1
4.0	15.	978.	265.	5.9	3011.	7.8
6.0	19.	978.	334.	6.5	3011.	9.6
8.0	23.	978.	406.	7.1	3011.	11.5
10.0	27.	978.	481.	7.7	3011.	13.4

MIDFLAME WIND (MI/H)	AREA (AC)	PERIMETER (CH)	LENGTH-TO-WIDTH RATIO (CH)	FORWARD SPREAD DISTANCE (CH)	BACKING SPREAD DISTANCE (CH)	MAXIMUM WIDTH OF FIRE (CH)
2.0	17.	54.	2.5	22.4	1.0	9.3
4.0	25.	68.	3.0	29.5	.9	10.3
6.0	33.	83.	3.4	37.2	.8	11.1
8.0	43.	99.	3.9	45.3	.8	11.9
10.0	53.	116.	4.4	53.6	.7	12.5

In discussing fire behavior, a high degree of variability exists for any given set of weather conditions because of the wide deviation in fuel types and elevations. The Little Pend Oreille NWR has been identified by the Washington GAP Analysis (Cassidy et al, 1997) as having one of the most diverse mixes of forest habitat types in the State and one of the most important reserves in the region for extensive ponderosa pine forests. This dry forest type epitomizes fire tempered forest habitat in the Western United States with its variety of vegetative adaptations and high fire frequency.

In any forest community where heavy surface fuels, ladder fuels and overstocked stands are encountered, one can expect to have catastrophic fires with extreme fire behavior at some point in time. This is the case at LPO. Because of this, a large part of our preparedness efforts will be directed toward "pre-conditioning" forest stands by mechanical means such as pre-commercial and commercial thinning prior to the re-introduction of fire. The mechanical manipulations will abate the risk associated with returning fire to the forest by decreasing ladder fuels and stocking levels.

Since the objectives of fire management at LPO are related to protection of life and property through suppression, and use of fire to enhance and maintain ecosystem integrity through prescriptive guidance, the **Appropriate Management Action (AMA)** for any given fire will be variable.

The AMA taken on a fire will be predicated upon two fundamental questions: 1) Is the fire occurring in an area for which an approved and current prescription exists?; 2) Is the fire burning within the parameters of the prescription?

If the answer to both of these questions is "yes", then the **Appropriate Management Response (AMR)** is defined below under the heading "Fire in Prescription". If the answer is "no" then the correct AMR will be found under "Fires NOT in Prescription".

If the above two criteria are met, the Refuge will take full advantage of the situation to meet our fire management goals by managing the burn as a prescribed fire until such time as the burn is completed, or the fire goes out of prescription for any reason. If the fire goes out of prescription it will be declared a wildfire and suppressed through implementation of the AMR. It is impossible to detail each suppression action since each fire requires different approaches depending upon weather conditions, time of day, fuels, available resources, terrain and a variety of other factors. It should also be noted that the development of AMR's is a dynamic process founded upon continued advances in fire science, forestry practices, tactics, strategies, equipment development and public perception of wildland fire's role in the ecosystem.

Fires NOT in Prescription

A fire, regardless of the source, is out of prescription when it occurs in an area where no prescription exists, or when it occurs in a prescription unit but does not conform to the parameters of the prescription. If a fire is determined to be out of prescription it will be suppressed. An **Appropriate Management Strategy (AMS)** will be devised to accomplish this based upon the methods described below.

Suppression actions may take any of the following forms:

1. **Direct attack:** Action taken close to the flaming front of a fire either at the rear, flank or head of a fire. Requires separation of fuels or use of agent (water, mineral soil, chemicals) to make the fuels unavailable to the combustion process. Often referred to as "working in the black".

2. **Indirect Attack:** Action taken away from the flaming front. Used when circumstances such as terrain, available resources or fire intensity prohibit direct attack or fire assessment indicates that the safest and most efficient strategy is to fight the fire from some manmade or natural fuel-break. Fuels between the fire line and the black area are usually burned out either actively or by letting the fire burn to the break.

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Primary initial attack resources will be via light engines and/or hand crews. These resources will be local, either LPO fire personnel, Washington State Department of Natural Resources (DNR), or United States Forest Service Personnel from the Colville National Forest (CNF). Reference Appendix C: Local Annual Operating Plan.

CNF Dispatch will function as our primary communications locale for fire and other related incidents. The Refuge currently shares frequencies with CNF, DNR, U.S. Bureau of Indian Affairs, Spokane Agency (BIA) and the National Park Service (NPS).

Prescribed Burning Overview

The adaptation of forest ecosystems to natural fire on the LPO NWR provides the key to the use of prescribed fire to accomplish many habitat related management goals.

This CCP covers the dry, moist, and cold forest regions of the LPO and it is expected that management activities will include prescribed burns throughout the Refuge over the years this plan will be in effect. The thrust of management on the LPO, as it relates to fire, will be to strive for native diversity of existing forest habitats and enhance those elements which have been degraded or lost through past activities such as removal of the mature and old growth forests through land clearing and timber harvest.

Natural fire has played an important role in the Columbia Basin Ecosystem and in particular the dry forests as described in our Comprehensive Conservation Plan (CCP). The role of fire will be continued with prescribed fire being used to simulate the effect of natural fire in habitat management.

As greater numbers of acres are conditioned for a return of fire, increasing acres of the Refuge will fall under a planned burning schedule. Burning will be guided by two primary tenets; A. Hazard Reduction and B. Resource Management.

Initially, most burning will be done to reduce fuel hazards, enhance deer winter range and establish a baseline of information (post-burn evaluations) which will facilitate future prescribed burn planning. As the dynamics of burning the Refuge's variety of forest habitats becomes better understood, in relation to the objectives and goals described in the CCP, it is anticipated that regular maintenance burning will become routine. At that time, while hazard reduction burning will always play a significant role in the fire program, resource burning will become of increasing concern as a method to achieve goals and maintain forest health. This is especially true in the ponderosa pine (dry forest type) of which only 3.9 % is in protected status managed primarily for biodiversity. Of this remaining habitat only a fraction remains in the old growth successional stage. It is a primary goal of this Refuge to restore a significant amount of ponderosa pine to its mature state.

Details of specific prescribed burns can be found in the Annual Prescribed Fire Plan (APFP). This Plan will have the individual prescriptions for each burn unit planned for any given year including backlog acres. A sample prescription format is attached to this FMP in Appendix A. Due to the constraints and often complicated logistics involved in executing prescriptions, every effort will be made to achieve the goals set forth in the Annual Prescribed Burn Plans. Backlog burn acres, that is those prescriptions which are not accomplished in the scheduled year, will become part of the succeeding year's Plan if appropriate.

Burn complexity will run the gamut from relatively simple in grass fuels, to high complexity under forest canopies where it is desirable to limit scorch heights, tree mortality and duff reduction. Ignitions will take advantage of hand firing, in most cases, because of tree canopies and to maintain better control of fire intensities. Hand firing will tend to lower complexities, as opposed to aerial ignitions, but limiting tree mortality in mature forests and enhancing deer winter range will tend to offset this advantage. It would be rare for the staff to attempt to burn more then one unit at a time, however some of the forested units may be as large as 600 to 700 acres which is quite sizable for this type of burning.

REQUIRED COORDINATION

The Little Pend Oreille is required to obtain burn clearance from the Department of Natural Resources prior to the implementation of the burn. The clearance procedure is used to ensure that weather conditions on the day of the planned burn are conductive to good smoke dispersal conditions (no inversions and wind directions which will carry the smoke away from populated areas). It also allows coordination of burns between agencies and private interests to prevent too many burns from being conducted simultaneously within the same airshed.

BURN SEASONS

The Little Pend Oreille has two burning seasons. One is in the spring, usually April and May, and the other is in the fall, September and October. For both of these seasons there is a short period of time when the burn will be in prescription, so the actual burning window is usually only a week for each season.

MONITORING

Prescribed fire monitoring is the systematic process for collecting and recording fuels, topography, weather, fire behavior, smoke and immediate post - fire effects information to provide a basis for evaluating and adjusting prescribed fire programs. Three primary goals of monitoring on the Refuge are: 1) Verify that fire weather, fuel moisture, and fire behavior are within prescription, 2) Quantitatively document immediate post - fire effects and compare with stated burn plan objectives, and 3) Ensure that fire and resource management objectives are being met.

Monitoring begins in the first stages of project planning. The existing condition of the vegetation, water quality, fuel loadings, soils, fish and wildlife habitat is determined using existing resource data, ground observations, and aerial photos.

Many different resource areas are monitored during the implementation of a prescribed fire to ensure the project is implemented as designed and that the implementation strategies are effective in meeting the objectives. Monitoring methods include weather readings, fuel - moisture samples, rainfall measurements, and meteorological observations and predictions to determine when and if the project area is within the prescription parameters. Meteorological observations and predictions are also used to ensure that the project will meet Smoke Management Plan guidelines. Walk through observations and photographs of project activities and fire behavior throughout project implementation are used to verify compliance with fish and wildlife standards, water quality standards, and fuel and vegetation goals and objectives. Weather readings, fuel moisture samples, and meteorological observations are also continued throughout implementation. A constant watch is kept on the direction and effectiveness of smoke dispersal.

Monitoring plots enable us to determine if the prescribed fire project accomplished what it was supposed to. Were the plans, prescriptions, and activities effective in meeting the project objectives and goals, and management direction. One permanent monitoring plot will be established in each project area. The plot center is marked with an eighteen inch piece of angle iron and trees can be tagged to reference the direction and distance to plot center. The plot locations are also recorded using a Global Position System (GPS) device. Each plot is a 100 foot photo transect typical of the area being burned. A series of panoramic photos will be taken from: each plot center. Photos will be taken before the burn, immediately after the burn, one year after the burn, 3, 5 and 10 years after the burn.

REGIONAL AND NATIONAL PREPAREDNESS

The National Interagency Mobilization Guide, which is revised annually, clearly describes interagency mobilization and dispatch procedures at all preparedness levels. Its directives will be followed on the Refuge without deviation, whether pertaining to wildland fire or prescribed fire.

Regional dispatch occurs through the Northwest Coordination Center located in Portland, Oregon. It reviews simultaneously occurring incidents and dispatches interagency resources on a priority basis. The Refuge may be called upon to provide resources or to receive requested resources based upon priorities established by the coordination center.

The Little Pend Oreille NWR will maintain a satisfactory state of preparedness at all times for wildland fire control and prescribed fire management.

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FIRES IN PRESCRIPTION

If the fire occurs in a prescription unit and is within prescription parameters, then the fire may be treated as a prescribed fire and managed accordingly to achieve predefined Refuge management goals such as fuel reduction, natural fire return interval or deer winter range habitat enhancement, as detailed in the prescription itself.

Constraints to implementing resource oriented fire management strategies are as follows:

1. Threats to human life and safety (including smoke and air quality)
2. Threats to public or private property
3. Imminent damage to threatened and or endangered species or their habitats
4. Imminent damage or destruction of culturally significant resources

AMS's for fires in prescription:

1. Indirect Attack: fire may be allowed to burn to the edges of the burn unit where it will be suppressed. This is acceptable as long as fire remains in prescription.
2. Monitor: fire may be allowed to burn as long as it is accomplishing prescription goals and remains in prescription.

Each year, prior to fire season, which begins by mid-June, fire personnel will be hired three to four weeks early in order to accomplish training and preparation for the coming season. This will entail such tasks as detailing engines and equipment, inventorying fire cache, joint exercises with cooperating agency crews, completing medical exams and pack testing personnel. Throughout the year, as individual training needs and course offerings coincide, the staff will make efforts to fulfill training goals.

When preparations are complete for the fire season, fire personnel will shift their emphasis to prescribed burn activities including burning pre-approved units and new unit preparation in accordance with the annual prescribed burn plan. This will require a variety of activities including thinning, construction of fire lines, mapping, monitoring and identifying and defining future burn units.

Air Quality/Smoke Management

Smoke Management: Under the direction of the federal Clean Air Act, The Washington State guidelines as described in the State of Washington Smoke Management Plan (Plan) will be adhered to. A copy of this Plan is on file at the Refuge office and may be reviewed in

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conjunction with this document. Copies are also available from the Washington Department of Natural Resources (DNR).

Advance notice to be provided to the Washington DNR Regional Office of the intent to burn, proposed date, expected duration, smoke impact areas and estimated tonnages of fuel expected to be consumed.

All prescriptions (see Appendix A) will contain a section detailing smoke management concerns and mitigation efforts.

On the day of the burn a call will be made to the DNR at 1-800-323-2876 (BURN) to get final burn day conditions and go no-go directions.

The Little Pend Oreille NWR lies to the east of Colville, Washington. Air quality in this area is generally considered excellent. Occasional impacts occur due to smoke from wildfires and debris waste burning from local landowners. Air quality monitoring stations have not been established in this area. Consequently, existing air quality data for the area does not exist. Generally a short term degradation in air quality is associated with prescribed fire activities. No known record of adverse impact of air quality has ever been filed due to prescribed fire activities in the area.

The general meteorology of wind patterns in this area fluctuate on a diurnal and seasonal pattern. Daytime ridge top winds are usually southwest during the burning season. This prevailing wind pushes smoke particulates to the northeast. Nighttime winds are generally light and downslope down valley, causing particulates to move down the Little Pend Oreille drainage.

Part of the federal Clean Air Act, as revised in 1991, is a legal mandate designed to protect human health and welfare from air pollution. The act defines Natural Ambient Air Quality Standards (NAAQS) as levels of pollutant above which detrimental effects on human health and welfare could occur.

The nearest federally designated Class I area (all national wilderness areas larger than 5,000 acres) is the Pasaytan Wilderness. The Pasayton Wilderness is located approximately 90 air miles to the west.

The city of Spokane is located approximately 80 miles to the south of the Refuge. Spokane is a federally designated non - attainment area. A non - attainment area is defined in the Washington State Smoke Management Plan, as a clearly delineated geographic area that has been designated by the Environmental Protection Agency as exceeding a national ambient air quality standard or standards for one or more of the criteria pollutants. These pollutants include carbon monoxide, fine particulate matter (PM10), sulfur dioxide, ozone, and nitrogen dioxide.

Currently any prescribed fire could occur on the Refuge if it doesn't exceed more than 180,000 pounds of PM-10 in a 24 hour period. The proposed prescribed fire program for the Little Pend Oreille NWR of burning 1000 acres annually will not impact regional air quality from the aspect of total particulate load input. If the recommendations for smoke mitigation outlined in this plan are followed the impacts from the proposed prescribed fire program will be of short duration (less than 8 hours) and will affect only areas directly adjacent to the burn area.

Burning when smoke dispersion conditions are favorable and in compliance with daily Washington State smoke management direction would minimize any adverse effects. All burning would be scheduled in conjunction with the State of Washington to comply with the State Implementation Plan to minimize adverse effects on air quality.

A good working relationship between the Fish and Wildlife Service, other Federal and State land management agencies, and interstate, state, and local air quality officials will help assure that both air quality control and fire management objectives are met with the least amount of conflict.

Shortly before prescribed burns are anticipated and during natural fires for resource benefits, information will be made available to state contacts, Refuge visitors, local citizenry, and the press about what is happening on the Refuge. On - site information will also be used to alleviate visitor concern about the apparent destruction of Refuge resources by fire or impairment of views due to temporary smoke.

Prescribed fire plans or Wildland Fire Situation Analysis will describe the holding actions which may be used to keep the fire within prescription for air quality objectives, particularly when smoke dispersion is deteriorating to the point that it is possible that smoke and air quality objectives will no longer be achieved. Examples may include:

D. A. Using firing crews to ignite fuels so that the fuels burn with the flaming rather than with smoldering combustion.
E. Constructing firelines to halt fire spread.
F. Mopping up smoldering heavy fuels until conditions improve for smoke dispersion, at which time the fire may be reignited.
G. Or, using hoselays and pumps to wet fuels to extinguish all or a portion of the fire front, with possible subsequent reignition under prescribed dispersal conditions.

Some principles that may be used to guide smoke management planning are:

A. Obtain and use weather forecasts.
B. Burn when conditions are good for rapid dispersion.
C. Determine the direction and volume of smoke.
D. Notify local fire dispatch office, nearby residents, and adjacent landowners.
E. Use test fires to confirm smoke behavior.
F. Mop - up along roads.
G. Burn when duff and soil moistures are high to prevent smoldering ground fires.
H. Anticipate down - drainage flow, particularly at night.

Management Constraints

Use of fire will be constrained by impacts to endangered species and their habitats, notably Canada lynx and by weather, fuel types, soil moisture, soil type, smoke dispersion patterns, available suppression resources both locally and nationally, and federal, state and local laws pertaining to wetlands protection and smoke management. Constraints will be specifically addressed in individual unit prescriptions.

Fire Management Units (see Map 7 in the Draft CCP/EIS)

Because of the overriding importance of watersheds to natural resource management, the Refuge has been divided into five primary management units to serve both habitat and fire management needs. Each primary unit is further sub-divided by secondary watersheds. To be consistent with our overall habitat management goals (see CCP for more details), the concept of the dry, moist and cold forest fire regimes found in each of these FMU's will be considered when detailed prescriptions are written to further compartmentalized the units and ensure continuity with Refuge resource management goals. Based on these natural features the units are defined as follows.

1. **Upper Little Pend Oreille River Watershed:** begins at the confluence of Bear Creek and the LPO River and extends to the northeast corner of the Refuge. Sub-watersheds include:

    A. Spring Creek
    B. McDowell Lake
    C. Starvation Lake Outflow
    D. Blacktail Creek
    E. Squaw Creek
    F. Prospect Creek
    G. Cedar Creek
    H. Amazon Creek
    I. Scrabblers Creek
    J. Olsen Creek

2. **Lower Little Pend Oreille River Watershed:** begins in the northwest corner of the Refuge and ends at the confluence of the LPO River and Bear Creek. Sub-watersheds include:

    A. Norman Creek
    B. Narcisse Creek
    C. Darly Lake

3. **Bear Creek Watershed:** begins at the mouth of Bear Creek and ends at the headwaters of Bear Creek along the southeastern Refuge boundary. Sub-watersheds include:

A. North Fork of Bear Creek
B. Numerous unnamed tributaries

4. **Bayley Lake Watershed:** begins in the Bayley Lake gorge and extends south via an underground outlet and a series of beaver ponds.

5. **Colville River Watershed:** begins at the hydrographic divide which separates the Lower Little Pend Oreille River Watershed from the extreme western portion of the Refuge which drains into the Colville River. Sub-watersheds include:

A. Long Lake
B. Moran Creek
C. Slide Creek

FUEL MODELS

There are 8 major fuel models (FM) which are found within the Refuge. A detailed description of each may be found in Anderson's guide Aids to Determining Fuel Models For Estimating Fire Behavior, GTR INT-122. They are listed in order of their relative abundance.

FM 11. Mixed conifer partial cut slash residue. NFDRS FM "K"

FM 10. Mixed conifer heavy dead and down fuels. NFDRS FM "G"

FM 8. Mixed Closed Canopy with light surface fuels and little brush. NFDRS FM "H"

FM 9. Closed canopy of long needle pine (ponderosa pine). NFDRS FM "U"

FM 5. Light brush fuels under a closed canopy. NFDRS FM "F"

FM 2. Light forest grass fuels under a partial canopy. NFDRS FM "C"

FM 3. Heavy tall grass fuels in sub-irrigated old pastures. NFDRS FM "N"

FM 1. Western grasses in upland meadows and pastureland. NFDRS FM "L" and "A"

Under extreme conditions FM 10 and 11 provide the greatest risk of extreme fire behavior and difficulty of control. At this time, there are no restrictions on actions which may be taken to extinguish wildfires because of the high fuel loads and potential risk in these fuel types.

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Appendix G, shows a range of values for Fuel Model 11 in the middle of August which is representative of one of our more difficult potential fire situations.

HABITAT MANAGEMENT OBJECTIVES

The habitat management objectives for each FMU as related to fire involve its application as a tool to emulate a natural phenomena which benefits Refuge forests and wildlife in general. Wildland fire response would be the same for all five of the FMU's. This corresponds with what the Forest Service does on our adjacent boundary.

Fire will be used to restore and maintain the natural balance to the ecosystem which has been absent due to fire exclusion. Specifically fire will be important in restoring the mature and old growth components of the ponderosa pine and dry Douglas-fir stands and in maintaining the vital deer winter range in a high quality condition. For details refer to the Comprehensive Conservation Plan and the Habitat Management Plan.

WILDLIFE

Important management initiatives currently being carried out, or which have been recently completed, which have a direct relationship to the fire management program:

1. Migratory Bird Survey

2. Canada Lynx (Felis lynx) Survey

3. Small Mammal Survey

Federally listed ***endangered species*** that may occupy the LPO;

> Peregrine falcon (Falco peregrinus); incidental sightings only, not likely to be affected by prescribed fire as planned on the LPO.
>
> Gray wolf (Canus lupas); unconfirmed sightings only. Increase in the wintering deer herd through manipulation of habitat with prescribed fire may be beneficial due to increasing food supply.
>
> Grizzly bear (Ursus arctos); No reported sightings on the Refuge, but is well documented nearby. Same effects as with gray wolf.

Federally listed ***threatened species*** that may occupy the LPO;

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Bald eagle (Haliaeetus leucocephalus); Year around resident, but no known nesting sites. Little effect to this species is likely. Areas slated for prescribed fire will be surveyed for eagle nests or other significant habitat features such as roosts or perches.

Species proposed for listing under the Endangered Species Act;

Of principal concern on this Refuge is the ***Canada Lynx*** (Felis canadensis). This species has specific forest habitat requirements that will dictate the nature and application of prescribed fire in areas where these animals may be impacted. Historic records show the lynx was found on the Refuge and recent reports of lynx sign indicate they still occupy the general area. A 1998 survey failed to detect lynx on the Refuge although seasonal habitat does exist at some of the higher places within the LPO. Since natural fire is infrequent in these areas, and little prescribed fire is planned for them, the impact of management fire will be minimal. However, in any given year, natural fire may have a significant impact on the available lynx habitat depending upon location, intensity and size.

Species of Concern, as designated by the USFWS include Columbia spotted frog, northern goshawk, black tern, olive sided flycatcher, Yuma myotis, long-eared myotis, fringed myotis, long-legged myotis, pale Townsend's big-eared bat, California wolverine, redband trout and westslope cutthroat trout.

The Northern Goshawk (Accipiter gentilis) is of concern since there is evidence that the ever increasing density of the forests in which it lives may be limiting its ability to hunt successfully (Reynolds, et. al, pgs 1-8). Foraging areas with diverse prey species form the largest habitat requirement for these raptors and conversion to shade tolerants is evident on the Refuge. The CCP goal of creating and maintaining a greater percentage of mature forest using prescribed fire, among other techniques, will have positive benefits for goshawks.

Details regarding habitat requirements and fire use in the management of these species will be outlined in the Wildlife Management Plan and the Habitat Management Plan.

PUBLIC INFORMATION AND EDUCATION

People who live in this area are well adjusted to prescribed burning by the surrounding land owners. These owners include small private forest land holders, large timber corporations, State lands, tribal lands and large federal landowners all of which practice prescribed burning. Nevertheless, public concerns may arise as a result of smoke from wildland burning, or from a general fear of forest fires. These concerns have routinely been addressed in the many public meetings that have been held in conjunction with the development of the Refuge CCP of which this FMP is attached as an Appendix. To date, no one has expressed unusual concern about the use of fire for management purposes on the Refuge.

The public will be notified of planned prescribed burning in advance of any actions and posting of information and educational materials at various Refuge locations such as campgrounds and kiosks throughout the Refuge is the current routine. The Refuge and the Colville NF also act in concert regarding fire danger ratings and the use of fire by visitors during periods of high fire danger.

PUBLIC SAFETY

Safety is the number one priority, whether for the public or for Refuge workers. Signing will be done when there is high fire danger and if there is a wildland fire precautions will be taken to inform the public. For prescribed fires, roads potentially affected by surface smoke will be signed with visibility hazard notifications and patrolled during and after the burn until visibility is safe for traffic. In addition, potentially affected individuals will be notified prior to the implementation of the prescribed fire.

REHABILITATION

All wildland fires will be rehabilitated following the control of the fire. Items that will be considered as to how extensive the rehabilitation will be are: 1) Location and size, 2) Soils, 3) Topography, 4) Climate, 5) Vegetation prior to the fire, 6) Intensity of the fire, 7) Hydrology, and 8) Landownerships involved.

CONSULTATION AND COORDINATION

For this Fire Management Plan the following people were consulted on a variety of issues: 1) Other Refuge staff, 2) Regional office planning staff and fire management, 3) USFS - Colville National Forest - Dispatch, 4) BIA - Spokane, 5) Turnbull NWR, and 6) Department of Natural Resources.

PRE-ATTACK PLAN

See Appendix I. (Not attached to this CCP)

STEP-UP PLAN/MANNING CLASSES

The following Manning Classes are related to the Burning Indices (BI) for National Fire Danger Rating System (NFDRS) Fuel Model U (FM 9 in Anderson Guide); Western Long Needle Pine, as computed by WIMS or on local PC's using FTS 88NFDRS or other appropriate software.

MANNING CLASS I=LOW; BI= 0-21

A. Working hours for all fire personnel; 0730-1600.

1. Service uniforms may be worn for routine work activities
2. Initial attack packs to be kept with all fire personnel.

B. Weekly equipment checks on engines, pumps, tractor plows and hauling units.

C. Cache to be cleaned and maintained weekly.

MANNING CLASS II= MODERATE; BI= 21-25

A. Working hours for all fire personnel; 0730-1600.

1. Service uniforms may be worn for routine work activities.
2. Initial attack packs to be kept with all fire personnel.

B. Weekly equipment checks on engines, pumps, tractor plows and hauling units.

C. Cache to be cleaned and maintained weekly.

MANNING CLASS III -HIGH; BI= 26-34

A. Working hours for all fire personnel; 0730-1600.

1. PPE worn when on duty.
2. Initial attack packs to be kept with all fire personnel.
3. Engines turned out and checked daily.

B. Daily equipment checks on engines, pumps, tractor plows and hauling units.

C. Cache to be cleaned and maintained weekly.

MANNING CLASS IV=VERY HIGH; BI=35-44

A. Working hours for all fire personnel; 1000-1830.

  1. PPE worn when on duty.
  2. Initial attack packs to be kept with all fire personnel.
  3. Engines turned out and checked daily.

B. Daily equipment checks on engines, pumps, tractor plows and hauling units.

C. Cache to be cleaned and maintained weekly.

MANNING CLASS V=EXTREME; BI=45 AND GREATER

A. Working hours for all fire personnel; 0900-2000 (or as required on daily basis).

  1. PPE worn when on duty.
  2. Initial attack packs to be kept with all fire personnel.
  3. Engines turned out and checked daily.

B. Daily equipment checks on engines, pumps, tractor plows and hauling units.

C. Cache to be cleaned and maintained weekly.

Appendix H. Birds, Mammals, Amphibians and Reptiles Observed or Predicted to Occur on the Little Pend Oreille National Wildlife Refuge.

Common Name	Scientific Name	Federal or State Listing	Source
Birds			
Common Loon	*Gavia immer*	SMC, SC	2
Western Grebe	*Aechmophorus occidentalis*	SM	2
Red-necked Grebe	*Podiceps grisegena*	SM	1
Pied-billed Grebe	*Podilymbus podiceps*		1
Double-crested Cormorant	*Phalacrocorax auritus*	SM	2
American Bittern	*Botaurus lentiginosus*	SMC	2
Great Blue Heron	*Ardea herodias*		1
Turkey Vulture	*Carthartes aura*	SM	2
Tundra Swan	*Cygnus columbianus*		2
Trumpeter Swan	*Cygnus buccinator*		2
Snow Goose	*Chen caerulescens*		2
Canada Goose	*Branta canadensis*		1
American Black Duck	*Anas rubripes*		2
Mallard	*Anas platyrhynchos*		1
Gadwall	*Anas strepera*		2
Green-winged Teal	*Anas crecca*		2
American Wigeon	*Anas americana*		2
Northern Pintail	*Anas acuta*		2
Northern shoveler	*Anas clypeata*		2
Blue-winged Teal	*Anas discors*		2
Cinnamon Teal	*anas cyanoptera*		2
Ruddy Duck	*Oxyura jamaicensis*		2
Wood Duck	*Aix sponsa*		1
Canvasback	*Aythya valisineria*	PIF	2
Redhead	*Aythya americana*		2
Ring-necked Duck	*Aythya collaris*		1
Lesser Scaup	*Aythya affinis*		2
Harlequin Duck	*Histrionicus histrionicus*	PIF	2
Oldsquaw	*Clangula hyemalis*		2
Barrow's Goldeneye	*Bucephala islandica*	PIF	1
Common Goldeneye	*Bucephala clangula*		2
Bufflehead	*Bucephala albeola*		2
Common Merganser	*Mergus merganser*		1
Red-breasted Merganser	*Mergus serrator*		2
Hooded Merganser	*Lophodytes cucullatus*	PIF	1
Osprey	*Pandion haliaetus*	SM	2

Common Name	**Scientific Name**	**Federal or State Listing**	**Source**
Bald Eagle	*Haliaeetus leucocephalus*	FT, ST	2
Golden Eagle	*Aquila chrysaetos*	SC	2
Northern Harrier	*Circus cyaneus*		2
Sharp-shinned Hawk	*Accipiter striatus*		1
Cooper's Hawk	*Accipiter cooperii*		2
Northern Goshawk	*Accipiter gentilis*	FC, SC, SMC	1
Red-tailed Hawk	*Buteo jamaicensis*		1
Swainson's Hawk	*Buteo swainsoni*	PIF	2
Rough-legged Hawk	*Buteo lagopus*		2
American Kestrel	*Falco sparverius*		1
Merlin	*Falco columbarius*	SC	1
Peregrine Falcon	*Falco peregrinus*	FE, SE	2
Gyrfalcon	*Falco rusticolus*	SM	2
Ruffed Grouse	*Bonasa umbellus*		1
Spruce Grouse	*Falcipennis canadensis*		1
Blue Grouse	*Dendragapus obscurus*	PIF	1
Northern Bobwhite	*Colinus virginianus*		2
California Quail	*Callipepla californica*	PIF	2
Gray Partridge	*Perdix perdix*		2
Ring-necked Pheasant	*Phasianus colchicus*		2
Wild Turkey	*Meleagris gallopavo*		1
Virginia Rail	*Rallus limicola*		2
Sora	*Porzana carolina*		1
American Coot	*Fulica americana*		1
Killdeer	*Charadrius vociferus*		1
Greater Yellowlegs	*Tringa melanoleuca*		2
Lesser Yellowlegs	*Tringa flavipes*		2
Spotted Sandpiper	*Actitis macularia*		1
Wilson's Phalarope	*Phalaropus tricolor*	PIF	2
Common Snipe	*Gallinago gallinago*		1
Black Tern	*Chlidonias niger*	FC, SM	1
Rock Dove	*Columba livia*		2
Mourning Dove	*Zenaida macroura*		1
Barn Owl	*Tyto alba*		2
Short-eared Owl	*Asio flammeus*	SMC, PIF	2
Long-eared Owl	*Asio otus*		2
Great Horned Owl	*Bubo virginianus*		1
Barred Owl	*Strix varia*		1
Great Gray Owl	*Strix nebulosa*	SM	2
Western Screech-Owl	*Otus kennicottii*	PIF	1
Flammulated Owl	*Otus flammeolus*	SC, PIF	1
Northern Pygmy-Owl	*Glaucidium gnoma*		1
Northern Saw-whet Owl	*Aegolius acadicus*		1
Common Poorwill	*Phalaenoptilus nuttallii*		2
Common Nighthawk	*Chordeiles minor*		1
Vaux's Swift	*Chaetura vauxi*	SMC, PIF	1

Common Name	Scientific Name	Federal or State Listing	Source
White-throated Swift	*Aeronautes saxatalis*		2
Black-chinned Hummingbird	*Archilochus alexandri*	PIF	1
Calliope Hummingbird	*Stellula calliope*	PIF	1
Rufous Hummingbird	*Selasphorus rufus*	SMC, PIF	1
Belted Kingfisher	*Ceryle alcyon*		1
Northern Flicker	*Colaptes auratus*		1
White-headed Woodpecker	*Picoides albolarvatus*	SC, PIF	2
Lewis's Woodpecker	*Melanerpes lewis*	SC, SMC, PIF	2
Red-naped Sapsucker	*Sphyrapicus nuchalis*	PIF	1
Downy Woodpecker	*Picoides pubescens*		1
Hairy Woodpecker	*Picoides villosus*		1
Three-toed Woodpecker	*Picoides tridactylus*	SM	1
Black-backed Woodpecker	*Picoides arcticus*	SC, PIF	1
Pileated Woodpecker	*Dryocopus pileatus*	SC	1
Eastern Kingbird	*Tyrannus tyrannus*		1
Western Kingbird	*Tyrannus verticalis*		1
Olive-sided Flycatcher	*Contopus cooperi*	FC, SMC, PIF	1
Western Wood-peewee	*Contopus sordidulus*		1
Say's Phoebe	*Sayornis saya*		1
Dusky Flycatcher	*Empidonax oberholseri*		1
Hammond's Flycatcher	*Empidonax hammondii*	PIF	1
Willow Flycatcher	*Empidonax traillii*	PIF	1
Cordilleran Flycatcher	*Empidonax occidentalis*	PIF	1
Northern Shrike	*Lanius excubitor*		2
Loggerhead Shrike	*Lanius ludovicianus*	SC, SMC	2
Cassin's Vireo	*Vireo cassinii*		1
Red-eyed Vireo	*Vireo olivaceus*		1
Warbling Vireo	*Vireo gilvus*		1
Steller's Jay	*Cyanocitta stelleri*		1
Gray Jay	*Perisoreus canadensis*		1
Clark's Nutcracker	*Nucifraga columbiana*		1
Black-billed Magpie	*Pica pica*		1
American Crow	*Corvus caurinus*		1
Common Raven	*Corvus corax*		1
Tree Swallow	*Tachycineta bicolor*		1
Violet-green Swallow	*Tachycineta thalassina*		1
Purple Martin	*Progne subis*		2
Bank Swallow	*Riparia riparia*		1
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		1
Cliff Swallow	*Petrochelidon pyrrhonota*		1
Barn Swallow	*Hirundo rustica*		1
Black-capped Chickadee	*Poecile atricapillus*		1
Mountain Chickadee	*Poecile gambeli*		1
Chestnut-backed Chickadee	*Poecile rufescens*	PIF	1
Boreal Chickadee	*Parus hudsonicus*	SM	2

Common Name	**Scientific Name**	**Federal or State Listing**	**Source**
White-breasted Nuthatch	*Sitta carolinensis*		1
Red-breasted Nuthatch	*Sitta canadensis*		1
Pygmy Nuthatch	*Sitta pygmaea*		1
Brown Creeper	*Certhia americana*		1
House Wren	*Troglodytes aedon*		1
Winter Wren	*Troglodytes troglodytes*		1
Rock Wren	*Salpinctes obsoletus*		2
American Dipper	*Cinclus mexicanus*	PIF	1
Golden-crowned Kinglet	*Regulus satrapa*		1
Ruby-crowned Kinglet	*Regulus calendula*		1
Western Bluebird	*Sialia mexicana*	SM, PIF	1
Mountain Bluebird	*Sialia currucoides*		1
Townsend's Solitaire	*Myadestes townsendi*		1
Veery	*Catharus fuscescens*		1
Swainson's Thrush	*Catharus ustulatus*		1
Hermit Thrush	*Catharus guttatus*		1
Varied Thrush	*Ixoreus naevius*	PIF	1
American Robin	*Turdus migratorius*		1
Gray Catbird	*Dumetella carolinensis*		1
Bohemian Waxwing	*Bombycilla garrulus*		2
Cedar Waxwing	*Bombycilla cedrorum*		1
European Starling	*Sturnus vulgaris*		1
Orange-crowned Warbler	*Vermivora celata*		1
Nashville Warbler	*Dendroica ruficapilla*		1
Yellow-rumped Warbler	*Dendroica coronata*		1
Black-throated Gray Warbler	*Dendroica nigrescens*	PIF	2
Townsend's Warbler	*Dendroica townsendi*	PIF	1
Hermit Warbler	*Dendroica occidentalis*		2
Yellow Warbler	*Dendroica petechia*		1
Northern Waterthrush	*Seiurus noveboracensis*	SM	2
MacGillivray's Warbler	*Oporornis tolmiei*	PIF	1
Wilson's Warbler	*Wilsonia pusilla*		1
Ovenbird	*Seiurus aurocapillus*		2
Common Yellowthroat	*Geothlypis trichas*		1
American Redstart	*Setophaga ruticilla*		1
Western Tanager	*Piranga ludoviciana*		1
Spotted Towhee	*Pipilo maculatus*		1
Song Sparrow	*Melospiza melodia*		1
American Tree Sparrow	*Spizella arborea*		2
Chipping Sparrow	*Spizella passerina*		1
Vesper Sparrow	*Pooecetes gramineus*		1
Savannah Sparrow	*Passerculus sandwichensis*		3
Lincoln's Sparrow	*Melospiza lincolnii*		3
White-crowned Sparrow	*Zonotrichia leucophrys*		2
Golden-crowned Sparrow	*Zonotrichia atricapilla*		2

Common Name	Scientific Name	Federal or State Listing	Source
Fox Sparrow	*Passerella iliaca*		1
Dark-eyed Junco	*Junco hyemalis*		1
Snow Bunting	*Plectrophenax nivalis*		2
Lazuli Bunting	*Passerina amoena*	PIF	1
Black-headed Grosbeak	*Pheucticus melanocephalus*	PIF	1
Western Meadowlark	*Sturnella neglecta*		1
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*		2
Red-winged Blackbird	*Agelaius phoeniceus*		1
Rusty Blackbird	*Euphagus carolinus*		2
Brewer's Blackbird	*Euphagus cyanocephalus*		1
Brown-headed Cowbird	*Molothrus ater*		2
Bullock's Oriole	*Icterus bullockii*		3
Pine Siskin	*Carduelis pinus*		1
American Goldfinch	*Carduelis tristis*		1
White-winged Crossbill	*Loxia leucoptera*		3
Red Crossbill	*Loxia curvirostra*		1
Pine Grosbeak	*Pinicola enucleator*		2
Common Redpoll	*Carduelis flammea*		2
Gray-crowned Rosy Finch	*Leucosticte tephrocotis*		2
Purple Finch	*Carpodacus purpureus*		2
Cassin's Finch	*Carpodacus cassinii*		1
House Finch	Carpodacus mexicanus		1
Evening Grosbeak	*Coccothraustes vespertinus*		1
House Sparrow	*Passer domesticus*		3

Amphibians and Reptiles

Common Name	Scientific Name	Federal or State Listing	Source
Tiger Salamander	*Ambystoma tigrinum*	SM	1
Long-toed Salamander	*Ambystoma macrodactylum*		1
Western Toad	*Bufo boreas*		1
Pacific Treefrog	*Hyla regilla*		1
Columbia Spotted Frog	*Rana luteiventris*	FC, SC	1
Painted Turtle	*Chrysemys picta*		2
Northern Alligator Lizard	*Elgaria coerulea*		3
Western Skink	*Eumeces skiltonianus*		1
Rubber Boa	*Charina bottae*		1
Racer	*Coluber constrictor*		3
Gopher Snake	*Pituophis catenifer*		1
Western Terrestrial Garter Snake	*Thamnophis elegans*		1
Common Garter Snake	*Thamnophis sirtalis*		1
Western Rattlesnake	*Crotalus viridis*		3

Common Name	Scientific Name	Federal or State Listing	Source
Mammals			
Masked Shrew	*Sorex cinereus*		1
Pygmy Shrew	*Sorex hoyi*	SC	3
Montane Shrew	*Sorex monticolus*		1
Water Shrew	*Sorex palustris*		3
Vagrant Shrew	*Sorex vagrans*		1
California Myotis	*Myotis californicus*		3
Long-eared Myotis	*Myotis evotis*	FC, SM	3
Little Brown Myotis	*Myotis lucifugus*		3
Long-legged Myotis	*Myotis volans*	FC, SM	3
Yuma Myotis	*Myotis yumanensis*	FC	3
Hoary Bat	*Lasiurus cinereus*		3
Silver-haired Bat	*Lasionycteris noctivagans*		3
Big Brown Bat	*Eptesicus fuscus*		3
Townsend's Big-eared Bat	*Plecotus townsendii*	FC, SC	3
Snowshoe Hare	*Lepus americanus*		1
Nuttall's Cottontail	*Sylvilagus nuttallii*		2
Yellow-bellied Marmot	*Marmota flaviventris*		3
Columbian Ground Squirrel	*Spermophilus columbianus*		1
Golden-mantled Ground Squirrel	*Spermophilus lateralis*		3
Yellow-pine Chipmunk	*Tamias amoenus*		1
Red-tailed Chipmunk	*Tamias ruficaudus*	SM	3
Red Squirrel	*Tamiasciurus hudsonicus*		1
Northern Flying Squirrel	*Glaucomys sabrinus*		1
Beaver	*Castor canadensis*		1
Northern Pocket Gopher	*Thomomys talpoides*		1
Bushy-tailed Woodrat	*Neotoma cinerea*		1
Deer Mouse	*Peromyscus maniculatus*		1
Gapper's Red-backed Vole	*Clethrionomys gapperi*		1
Long-tailed Vole	*Microtus longicaudus*		1
Montane Vole	*Microtus montanus*		3
Meadow Vole	*Microtus pennsylvanicus*		1
Richardson's Vole	*Microtus richardsoni*		3
Muskrat	*Ondatra zibethicus*		1
Heather Vole	*Phenacomys intermedius*		3
Northern Bog Lemming	*Synaptomys borealis*	SM	3
Western Jumping Mouse	*Zapus princeps*		3
Porcupine	*Erethizon dorsatum*		1
House Mouse	*Mus musculus*		1
Coyote	*Canis latrans*		1
Red Fox	*Vulpes vulpes*		1
Black Bear	*Ursus americanus*		1
Raccoon	*Procyon lotor*		1
Marten	*Martes americana*		3

Common Name	**Scientific Name**	**Federal or State Listing**	**Source**
Fisher	*Martes pennanti*	FC, SC	3
Ermine	*Mustela erminea*		2
Long-tailed Weasel	*Mustela frenata*		1
Mink	*Mustela vison*		1
Wolverine	*Gulo gulo*	FC, SM	3
Badger	*Taxidea taxus*		1
Striped Skunk	*Mephitis mephitis*		1
River Otter	*Lutra canadensis*		2
Canada Lynx	*Lynx canadensis*	FP, ST	3
Bobcat	*Lynx rufus*		1
Elk	*Cervus elaphus*		1
Mule Deer	*Odocoileus hemionus*		1
White-tailed Deer	*Odocoileus virginianus*		1
Moose	*Alces alces*		1

Status:

FE	Federally listed endangered species
FT	Federally listed threatened species
FP	Species proposed for federal listing
FC	Species of concern (species that could be proposed or listed in the future)
SE	State listed endangered species
ST	State listed threatened species
SC	State listed candidate species
SM	State listed monitor species
MC	USFWS Region 1 species of management concern (birds only)
PIF	Bird species identified by the Partner's in Flight program as being of extremely or moderately high conservation concern

Source:

1	Species both projected by GAP analysis to reproduce on the Little Pend Oreille National Wildlife Refuge (LPO) and have been observed on the LPO.
2	Species not projected by GAP analysis to reproduce on the LPO, but have been observed on the refuge. Not necessarily breeding.
3	Species projected by GAP analysis to breed on the LPO but have not been observed on the refuge.

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Appendix I: Mailing List for the Little Pend Oreille National Wildlife Refuge Planning Process

FEDERAL, STATE, AND LOCAL AGENCIES

Stevens County Noxious Weed Board
Tri-Co Economic Development District
Stevens County Historical Society
Stevens County Conservation District
Jim Degraffenreid, Stevens County Planning
Sue Winterowd, Stevens County Weed Board
Willapa National Wildlife Refuge
Nisqually National Wildlife Refuge
CA/NV Refuge Planning Office, USFWS
Ridgefield NWR Complex
Lake Roosevelt District Ranger, National Park Service
Turnbull National Wildlife Refuge
Bureau Of Land Management
Maggie Arend, USFWS-Refuge Planning, AK
Tom Baca, U.S. Fish And Wildlife Service
Helen Clough, USFWS - Refuge Planning, AK
Charles Dauner, USFWS-Division Of Realty
Forest Supervisor, Colville National Forest
Jim Kolthoff, Newport Ranger Dist, NFS
Tom Larson, USFWS-Division Of Realty Planning
Frank R. Lockard, Ducks Unlimited Field Staff
Jim McGowan, U.S. Forest Service
Phil Moyle, U.S. Geologic Survey
Norm Olson, USFWS - Division Of Realty
Carol Taylor, U.S. Fish And Wildlife Service
Meredith Webster, U.S. Forest Service
Tom Weinmann, U.S. Forest Service
Kelly Cassidy, WA Coop. Fish & Wildlife Res. Unit
G. A. Palmanteer, WA Dept Of Fish & Wildlife
Regional Mgr. Dept. of Nat. Resources
Bruce Smith, WA Dept Of Fish & Wildlife
Sandra Madison, City of Colville
Col. Flower, Commander, Air Force Survival School
Major Diane L. Williams, Army National Guard
Dan Len, Colville National Forest
John Andrews, Washington Dept. Of Fish and Wildlife
Don Strand, Washington Dept. of Natural Resources
Bob Gillaspy, Natural Resource Conservation Service
Charles McComb, WA Dept of Fish and Wildlife

ELECTED OFFICIALS

Fran Bessermin, County Commissioner
  Stevens County
Mike Hanson, County Commissioner
  Pend Oreille County
Joel Jacobsen, County Commissioner
  Pend Oreille County
Fred Lotze, County Commissioner, Stevens County
Karl McKenzie, County Commissioner
  Pend Oreille County
Vickie Strong, County Commissioner, Stevens County
Craig Thayer, Stevens County Sheriff
Roy McCoy, Mayor, City of Chewelah
Duane Scott, Mayor, City of Colville
James R. Davis, Mayor, City of Kettle Falls
Slade Gorton, U.S. Senator
Patty Murray, U.S. Senator
George R. Nethercutt, Jr., U.S. Representative
Gary Locke, Governor
Cathy McMorris, State Representative
Bob Morton, State Senator
Bob Sump, State Representative

TRIBES

Joe Pakootas, Chairman, Confederated Tribes of the Colville Reservation, Business Council
Glen Nenema, Chairman, Kalispel Tribe of Indians
Bruce Wynne, Chairman of Business Council, Spokane Tribe
Steve Judd, Colville Tribe Fish and Wildlife
B.J. Kieffer, Spokane Tribe Of Indians
  Natural Resources
Ray Entz, Kalispel Tribe Fish and Wildlife

ORGANIZATIONS AND INDIVIDUALS

Dorrit Abbel
Norm & Rose Aherns
Jim Aked
Mark Albert
Calvin Alderson
John & Lynn Alderson
Jane Allep
Kurt & Annette Anderson
[illegible] Anderson
Margaret Anderson
[illegible] Archer
Carol Austin
Bud Aveter
Barry Bacon
Chuck, Nicole, And Barbaraann Baker
Patrick Barker
Dana Base
Jim Beardslee
Judy Beardslee
Steve Beardslee
Jim Beardsley
Dan & Evelyn Bell
Gary Bellinger
Missy Bennett
Keith & Ann Berger
Connie Bergstrom
Martin Berrens
Jim Berry
Tomas Billings
Greg Binder
Troy Binfield
Mike Bischoff
Joe & Barb Bishop
[illegible] & Bernice Blake
John Baaser
[illegible] R. And Christine Bolich
Michael Borysewicz
[illegible]
[illegible] Bovee
[illegible]
Steve Bradburn
Marty Bray
[illegible] Briem
[illegible] Brousseau
Michael Bryan
Larry & Patsy Cada
[illegible] & Margie Cameron
David Carlson
Ken Carmichael
James Carter
Paul & Diana Chapman
Ken & Joan Chellis
Larry J Christer
Chris Christensen
[illegible] Christensen
Pete Christianson
Gail Churape
Jim Clark
Alpha Clark
Kim Clarkin
Chuck Clayson
Bob & Elaine Cole
Tom & Jane Colvin
Mitch Combs
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Wayne Covey
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D. Denison
Dale Denney
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Barb Dubell
Dick Dubell
Philip Dubois
Tim Durnell
Lannett Earnhart
Fred Ebel
Jim Egeland
Larry Enright
Alan Enveart
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Willis Garretson
Edgar Garrett
Armand Gauthier
Rollie Geppert
Kenneth Goldbach
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Nikki Goth

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Erin Haick
Todd Halvorson
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Tracy Hansen
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Ronald Hastings
Joann Hawley
Ken Hayes
Ken Hayes
Leon Hayes
Mike, Maureen & Jeremy Hazlett
Bob Heater
Larry Heming
Bill Hendrix
Ca Henry
Ron & Marcie Heough
Ken & Opal Herrick
Bill Hewes
G J Hickman
Lawrance Hicks
Tom Higgins
James Hines
Roland Hintze
Tim Hoecher
Ken Hoff
Bill & Faye Hoke
Darlene Holcomb
Karl Holling
George H Holman
Leroy Holmes
Kenneth Hotchkiss
Lee Hubert
Al Huguenin
Clarence, David And Donna Hunt
Ann Hurst
Robert & Julie Hysom
Ellen Imsland
Brian Johnson
Mary Jokela
Kay Jones
John Kaser
George & Mary Kelly
Rich Kelson
David Kent
Richard & Minnie Kenyon
Bruce Kessler
Ivan Kitt
Dale Kitt
William Kline
Tom Kneeshaw
Lorraine Knisley

Ted And Laura Krauss
Kim And Randy Krohn
Andy & Bobbi Kroiss
Mike Larkin
R Larson
Charles Latimer
Melvin Lawrence
Bret Le
Mark & Carol Leach
Perry & Francis Leach
Ken & Sandy Leight
Russ Lenocker
Albert & Shirley Lewis
D Lickey
Kia Lilley
Walt Lindman
Chris Loggers
Fred & Cena Lotze
Lloyd Lovell
Lisa Lucas
Paul & Beverly Lucero
Don Ludeman
Dan Lynds
Richard Hoover & Margaret Lynt Lynt
Gene & Carman Machamer
Ruby Madison
Lorraine Marie
Doug & Pat Markham
Sue Martens
Craig Martin
Dan Martin
Renea Martin
Bill Mathison
Harold Mattoon
Ed & Anges Maxon
Roger May
Jerry Mcbride
Rebecca Mccann
Charles Mccomb
Lloyd Mcgee
Roe Mcgrath
Mike Mcgreevy, Boise Cascade Corp
Gaine & June Mckay
Bill & Arline Mckay
Guy & Peggy Mckee
Forrest Mcgeehan
Gayle Mckellar
Ronald Mckerlie
Tom Mckern, SCNWCB
Kenneth Mcknight
Bruce & Jan Mclain
Beverly Mclaughlin
Dale & Janette Mcleod
Lee Meninch
Chris Merker
Jon & June Michael
Ray & Eileen Miller
Mike Miller
Ron Miller

Brian Miller
Jim Moe
Ole Moorhead
Grant And Nancy Morgan
Bruce Moriarty
Toby And Tammy Morris
Ted & Mavis Morris
Cora Morrison
Harry & Roberta Morrow
Tom Munson
Maureen Murphy
Tom & Linda Myers
George Naker
Pam Newman
Wayne And Vi Newman
Kate Nelson
Mr Niemann
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Roy & Lindy Ogden
Marvin Olson
Sheri Olson
Dwight Opp, Stimson Lumber
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Charles Paddleford
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Bailey Philpott
Pierson
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Frank Potter
Irene Potter
Julian Powers
Tim Pratt
Gary & Sharon Preston
Elizabeth Price
Steven And Tana Proszek
Stanley Pulcer
Cliff Ralston
George Raska
Kathy Rathbun
Ralph Rau
Marvin Ray
Dave & Linda Reed
Ron & Jamie Rehn
Jerry A. Reiber
Ian Reynolds
B. Rhines
Harold Rice
Oscar & Evelyn Romo Rieck
Carroll Rieck
Ryan Roberts
Dave Robinson
John Rodgers
Oscar And Evelyn Romo
Carey And Pam Rose
Fenton Roskelley
Dwayne Ross
Milaine Rosslow
Hubert Saxe
Shirley Sanders
Frances Sattler
Jerry Sattler
Keith Saxe
Dick & Grace Schoel
Ray Schueler
Joel Schuerman
Ed Schultz
Mariah Schuttpelz
Dave & Laura Schwimmer
Mayor Duane Scott
Wayne Seil
Gordon & Sue Sell
Mike Shaughnessy
Ed & Linda Shaw
Mary Shisler
Wayne & Donna Siegel
Keith & Cindy Siemon
Raymond Sletten
Glenn Smith
Jerry & Karen Snyder
Dale South
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Fred Spartz
Mike Steinbach
Mary And Jim Stephens
Adrian S. Stringer
Karen Sullens
Bob Sullivan
Bob Sump
Terry Sverdsten
Terry Sverdsten
Michael Swan
Richard Swim
Lyle Tadlock
Ross Talbot
W.A. Taylor
Grace Taylor
Robert Terrill
Chuck & Wanda Thomas
Wes & Carole Thomas
Toni Thompson
Georgia Thompson
Howard Tiffany
Bill Tobey

Don Tryon
Steve Tveit, Boise Cascade Corp
L.O. Ussery
Mick Vaagen
Duane Vaagen
Wayne Vaagen
Curt Vail
Bruce Vails
Catherine Vanalyne
Maurice Vial
Karen Vielle
Jay And Charlene Violette
Christine Vosen
Walter Wagner
Walter Wagner
Rick & Mary Waite
Larry J Walker
Larry Walker
Otto Ward
Dana Ward
Leslie E Waters
Keitlyn Watson
Frank Weeks
Dave Weeman, Boise Cascade Corp
Blendena Weir
Clayton & Mary West
Valerie White
Dave Whitwill, Boise Cascade Corp
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Angus Williams
J.B. Williamson
Terry Wilson
Christine Wilson
Brett Winterowd
Rory Wintersteer
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Shawn Woodard
Don Wooten, Stimson Lumber Co.
Steve Zender
Karl Ziegler
North Columbia Monthly
Chris Cowbrough, Statesman Examiner
Rich Landers, Spokesman-Review
Doug Nadvornick, KPBX
Sharon Vail, Kiro News

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Washington Native Plant Society
National Wildlife Refuge Assoc
NW Forestry Assoc
Northwest Alloys
North Country Coop
Mid-Columbia Refuges
Inland Empire Backcountry Horsemen
Delta Gun Shop
Lands Council
Inland Empire Flyfishing Club
Seattle Audubon Society
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Robert Fields, NWRA Pacific
Mitch Friedman, Northwest Ecosystem Alliance
Jim Gleaton, Nat. Resource Conservation Service
Suzanne Hempleman, Audubon Society
Mike Irving, Inland Emp Pub Lands Council
Bob Kennedy, Black Hills Audubon
James Layman, Inland NW Wildlife Council
David Morrison, The Nature Conservancy
Erin Nuxoll, NE Women In Timber
Julie Sibbing, National Audubon Society
Curt Soper, The Nature Conservatory
Clint Watkins, WA Trails Assoc
Lora Wondolowski, Nationall Audubon Society Ark
Community Colleges Of Spokane
Gary Blevins, Spokane Falls Comm. College-
Dept Of Biology
Richard Dlole, Superintendent Of Schools
Peter Greissman, WSU Extension
Paul Lindholdt, Eastern Washington University
Wayne Madson, WSU Extension
Peggy O'connell, Eastern Washington University
Chewelah Chamber Of Commerce
Colville Chamber Of Commerce
Kettle Falls Chamber Of Commerce

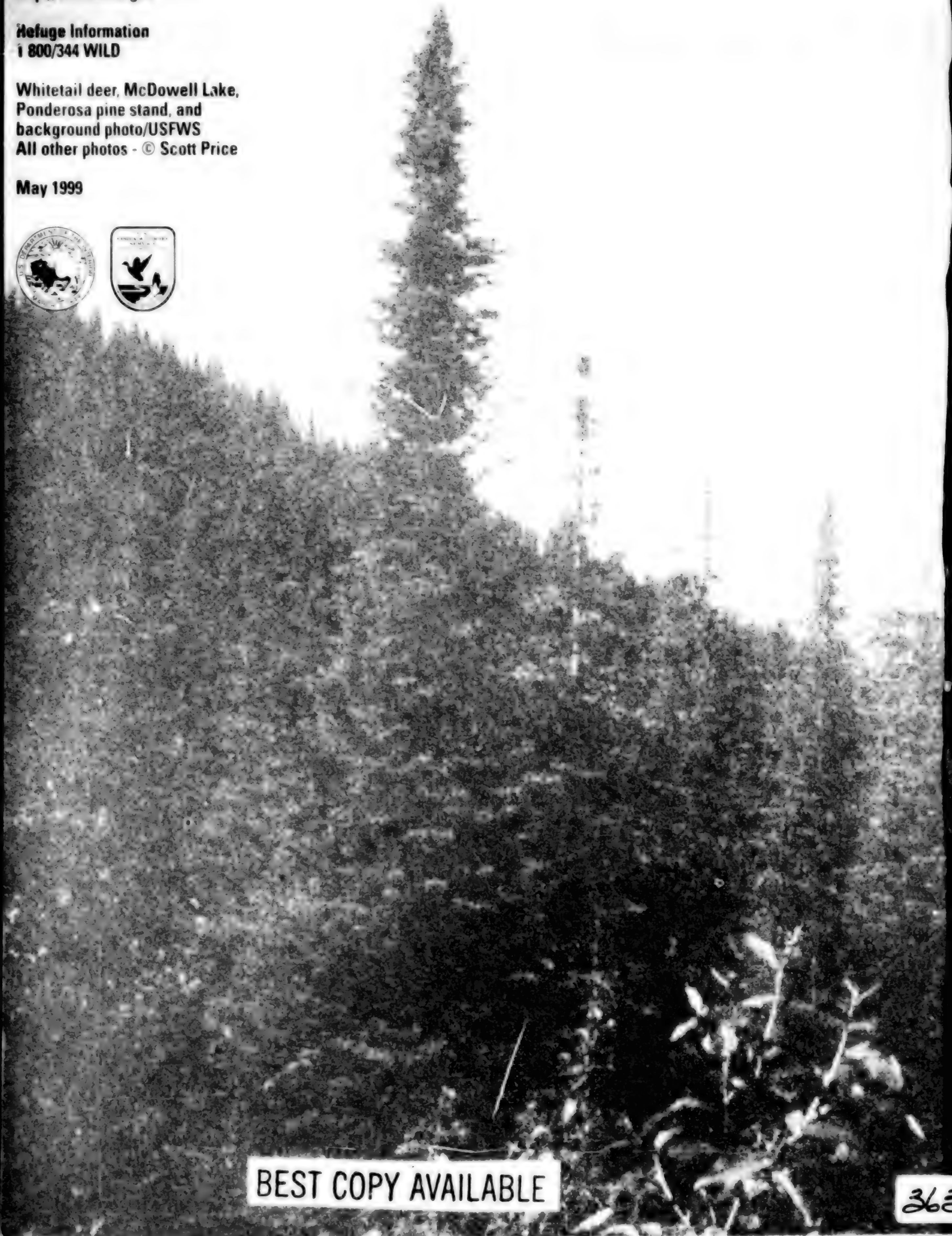
Little Pend Oreille NWR
1310 Bear Creek Road
Colville, Washington 99114
509/684-8384

U.S. Fish & Wildlife Service
http://www.fws.gov

Refuge Information
1 800/344 WILD

Whitetail deer, McDowell Lake, Ponderosa pine stand, and background photo/USFWS
All other photos - © Scott Price

May 1999



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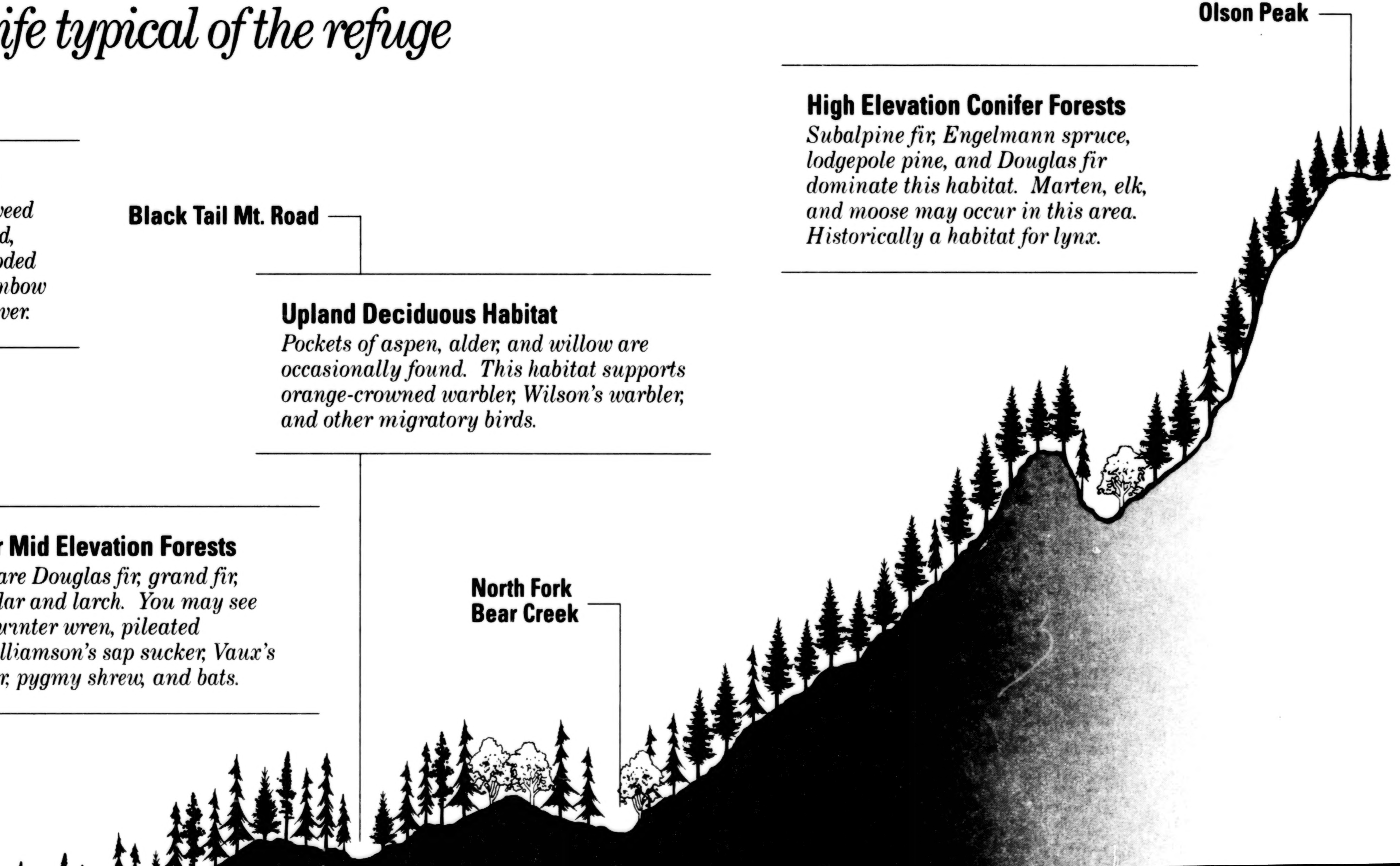
Little Pend Oreille

National Wildlife Refuge - Major habitats and wildlife typical of the refuge



Old Fields
Perennial grass and weeds attract white-tailed deer, pocket gophers, Columbian ground squirrels, and many birds.

Lakes, Wetlands & Wet Meadows
Comprised of alder, willow and pondweed this habitat is frequented by bufflehead, common goldeneye, heron, osprey, hooded merganser, king fisher, bald eagle, rainbow and brook trout, amphibians, and beaver.

High Elevation Conifer Forests
Subalpine fir, Engelmann spruce, lodgepole pine, and Douglas fir dominate this habitat. Marten, elk, and moose may occur in this area. Historically a habitat for lynx.

Upland Deciduous Habitat
Pockets of aspen, alder, and willow are occasionally found. This habitat supports orange-crowned warbler, Wilson's warbler, and other migratory birds.

Ponderosa Pine Forests
These forest often have a well developed understory of serviceberry, snowberry, ceanothus and pine grass. Wildlife includes white-headed woodpecker, flammulated owl, pygmy nuthatch, silver-haired bat, and yellow-pine chipmunk. This habitat is a wintering area for white-tailed deer.

Mixed Conifer Mid Elevation Forests
Common trees are Douglas fir, grand fir, Western red cedar and larch. You may see brown creeper, winter wren, pileated woodpecker, Williamson's sap sucker, Vaux's swift, black bear, pygmy shrew, and bats.

Alluvial Riparian & Instream Habitat
Vegetation includes deciduous shrubs

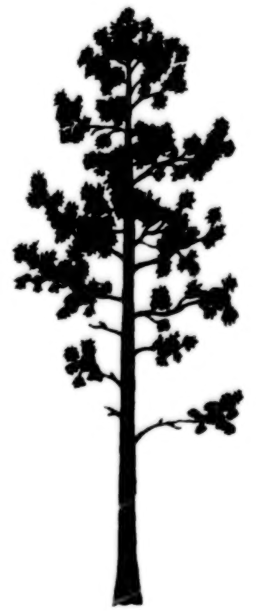
pygmy nuthatch, silver-haired bat, and yellow-pine chipmunk. This habitat is a wintering area for white-tailed deer.

Common trees are Douglas fir, grand fir, Western red cedar and larch. You may see brown creeper, winter wren, pileated woodpecker, Williamson's sap sucker, Vaux's swift, black bear, pygmy shrew, and bats.

Alluvial Riparian & Instream Habitat

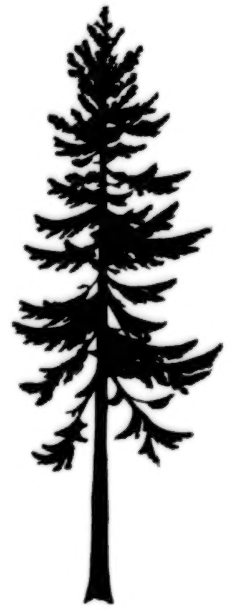
Vegetation includes deciduous shrubs and trees, sedges, and grasses. Wildlife includes native and introduced trout, amphibians, bats, riparian-dependent birds, and deer.

■ Dry Forest



The lowest elevation areas at Little Pend Oreille NWR are dominated by "dry forests". These forests are comprised of trees that can withstand hotter, drier conditions and frequent fire. The ponderosa pine and Douglas-fir are found in this zone. Both species develop thick bark as they grow, which protects the largest trees from fire damage. Because of fire suppression at LPO, many young trees have sprouted and grown, causing the dry forests to become overcrowded and susceptible to disease.

■ Moist Forest



Douglas-fir, grand fir and many other tree species are found in the "moist forests" which cover the mid elevations at LPO. This zone receives more precipitation and can support denser forests. Under natural conditions, these forests also burn, but generally at longer intervals than the dry forests. These forests are also more vulnerable to lethal crown fires than the dry forests. Today at LPO, these forests show the effects of fire suppression and fragmentation by past logging.

■ Cold Forest

Covering the highest ridges at LPO are "cold forests", represented mainly by subalpine fir and Engelmann spruce. Growth is slow in these zones and nutrients may be limiting. Standing dead and downed trees may persist for a long time because cool temperatures slow decomposition. The fire cycle in this zone is variable and difficult to predict. These forests at LPO are relatively undisturbed.

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